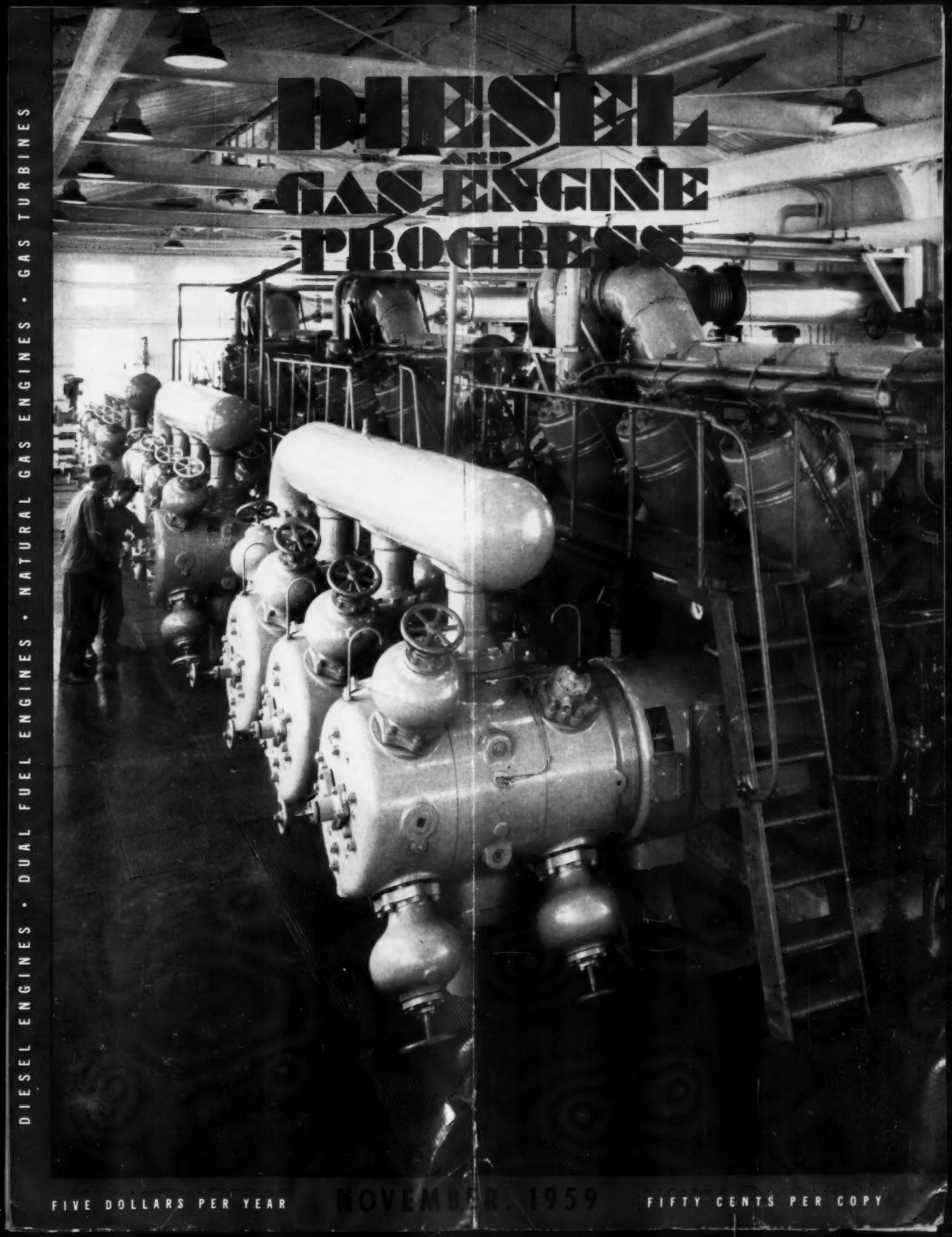
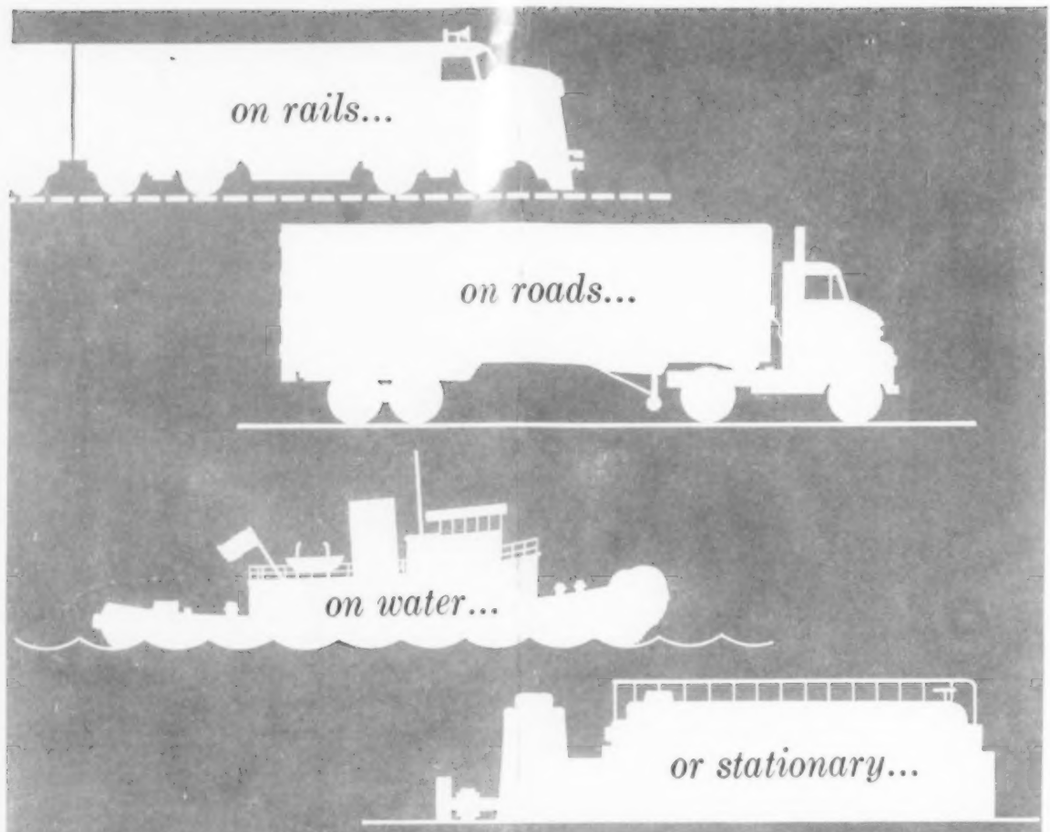


DIESEL AND GAS ENGINE PROGRESS

DIESEL ENGINES • DUAL FUEL ENGINES • NATURAL GAS ENGINES • GAS TURBINES

FIVE DOLLARS PER YEAR NOVEMBER, 1959 FIFTY CENTS PER COPY



DIESELS RUN BETTER ON TEXACO URSA OILS

Rings stay free, engines stay clean when they're Texaco lubricated. You get the full compression needed for complete combustion. Your fuel consumption goes down, parts life goes up, maintenance costs are lower.

There is a complete line of Texaco Ursa Oils to meet the exact needs of every type and size of diesel. Your Texaco Lubrication Engineer will gladly help you make the proper selection.

Just call the nearest of the more than 2,300 Texaco Distributing Plants or write: Texaco Inc., 135 East 42nd Street, New York 17, N.Y.

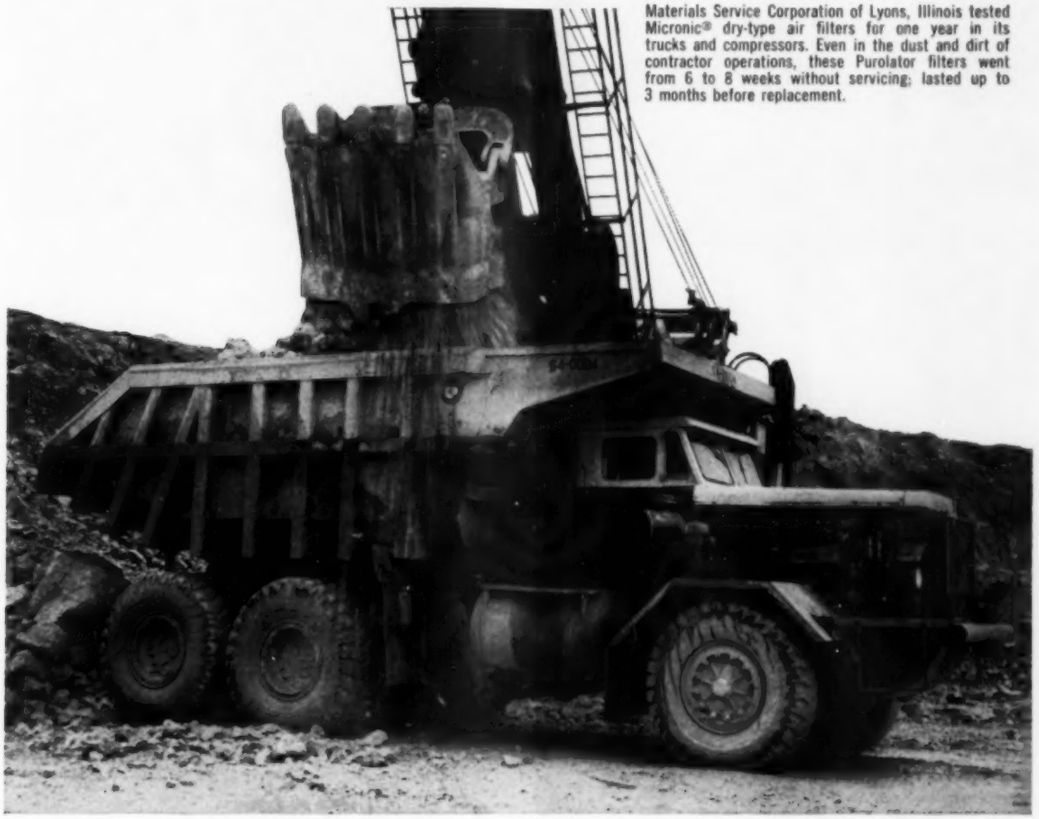
Tune In: Texaco Huntley-Brinkley Report, Mon.-Fri.-NBC-TV

TEXACO

Throughout the United States
Canada • Latin America • West Africa

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL
(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

Here's why it pays manufacturers to specify Purolator air filters as original equipment



Materials Service Corporation of Lyons, Illinois tested Micronic® dry-type air filters for one year in its trucks and compressors. Even in the dust and dirt of contractor operations, these Purolator filters went from 6 to 8 weeks without servicing; lasted up to 3 months before replacement.

"We proved Purolator could save us up to $1000 per year per truck"

—Materials Service Corporation

Savings from reduced labor, parts cost, and maintenance downtime — plus prolonged engine life — amount to as much as $1000 per truck each year.

That's the verdict from Materials Service Corporation, after testing Purolator dry-type air filters in its trucks and compressors for a full year. At present they are operating trucks 6 to 8 weeks between element servicings. And their Purolator dry-type air filters are used up to 3 months without replacement.

These savings are common in fleets equipped with Purolator Micronic® dry-type air filters. That's because this Purolator filter is more than 99% effective at *all* engine speeds; its controlled porosity keeps all harmful particles from reaching the upper engine; it's easy to maintain and replace.

Remember these benefits the next time your customers specify Purolator Micronic air filters. Think about them, too, in considering Purolator air filters for original equipment on your own standard line of diesels.

Ask a Purolator Engineer to demonstrate how Purolator filtration provides advantages and economies for fleet owners — and benefits for you. Write or call today — and ask for the booklet, Purolator Micronic Dry-Type Air Filters.

Filtration For Every Known Fluid

PUROLATOR PRODUCTS, INC.

RAHWAY, NEW JERSEY AND TORONTO, ONTARIO, CANADA

General Motors Reliability in Action...

Mechanical Blizzard!

Harrison Heat Exchangers —Reliable Products of General Motors Research and Engineering.

HARRISON COOLS OIL FOR DIESEL-POWERED SNOW MACHINE THAT PRODUCES 10-INCH SNOWFALL IN AN HOUR

Snow is made to order for perfect skiing all winter long at Mt. Christie in Michigan. Water and compressed air are mingled and distributed as a fine spray through a series of sprinkler heads. By this method a 24,000 sq. ft. area can be covered with a ten-inch snowfall in an hour! And this Diesel-powered snow machine counts on Harrison heat exchangers to control vital operating temperatures. That's because Harrison, with a half century of experience in the heat control field, builds reliability into every product. So, if you have a cooling problem, rely on Harrison for the answer.

GM TEMPERATURES MADE TO ORDER

HARRISON

AIRCRAFT, AUTOMOTIVE, MARINE AND INDUSTRIAL HEAT EXCHANGERS

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORPORATION, LOCKPORT, NEW YORK

DIESEL AND GAS ENGINE PROGRESS

REX W. WADMAN — *Editor and Publisher*

IN INDUSTRY · IN TRANSPORTATION · ON THE SEA · IN THE AIR

MEMBER OF BPA
Business Publications Audit of Circulation, Inc.

BRUCE W. WADMAN — *Executive Vice Pres.*
ROBERT E. SCHULZ — *Managing Editor*
ANTHONY A. ALBERTE — *Associate Editor*
JAMES W. BROWN — *Midwest Editor*
DONALD M. TAYLOR — *Southwest Editor*
ANN E. GAFFNEY — *Production Manager*
ANNE S. GALARIS — *Circulation Manager*

MEMBER OF VAC
Verified Audit Circulation Company

DIESEL AND GAS ENGINE PROGRESS for November, 1959, Vol. XXV, No. 11. Published Monthly by Diesel Engines, Inc., 1701 W. Wisconsin Ave., Milwaukee 3, Wisc. Phone DIvision 4-5355. Subscription rates are $5.00 for U.S.A. and possessions. All other countries $7.50 per year. Subscriptions may be paid the London Office at £2-12s-6d per year. Accepted as Controlled Circulation Publication at Long Prairie, Minnesota.

DIESEL AND GAS ENGINE PROGRESS is indexed regularly by Engineering Index, Inc. and is available in microfilm editions from University Microfilms, Inc., Ann Arbor, Michigan.

MEMBER OF MPA
Magazine Publishers Association, Inc.

CONTENTS FOR NOVEMBER, 1959

Farm Use of Diesel Increases 19
Cooper Bessemer's Lightweight 10,500 HP Gas Turbine 22
New Alaska Standard Plies Tricky Waters 24
Trucks Repowered With Small GM Diesel 26
High Pressure Supercharging and Valve Overlap Control 28
Close Coupled Brushless Generators 30
American Marc Unveils New Diesel Outboard 32
Florida's Quest for Oil 34
Diesels Hum as Navajo Dam Rises in Canyon 39
Automatic Operating Diesel Plants 42
Service Award Based on Rigid Tests 44
335-375 HP IH Tractor Built for Toll Roads 45
West Coast Hospitals Rely on Diesels 46
Continental's Gas Turbine Compressor 48
What's Going on in England 50
Diesel Service Progress 52

EXECUTIVE OFFICES
816 N. La Cienega Blvd.
Los Angeles 46, Calif.

EDITORIAL OFFICES
1701 W. Wisconsin Ave.
Milwaukee 3, Wisc.

BUSINESS OFFICES

MILWAUKEE 3:
Bruce W. Wadman
1701 W. Wisconsin Ave.
DIvision 4-5355

LONDON E.C. 4:
G. L. Fetherstonhaugh
St. Paul's Corner
Ludgate Hill
City 5318

FIELD EDITORS

HIALEAH, FLA.:
Edwin Dennis
250 W. 50th St.
TUxedo 8-2188

LOS ANGELES 46:
James Joseph
8421 Melrose Ave.
OLive 3-4542

WALNUT CREEK, CALIF.
F. Hal Higgins
90 Grand View Place
YEllowstone 4-9531

HOUSTON 18, TEXAS
Donald M. Taylor
1345 Chamboard Lane
OVerland 6-1127

PORT LAVACA, TEXAS:
Ruel McDaniel
214 Suncrest Dr.
JAckson 4-2495

JEFFERSON CITY, MO.:
L. H. Houck
400 Linden Dr.
Phone: 6-2993

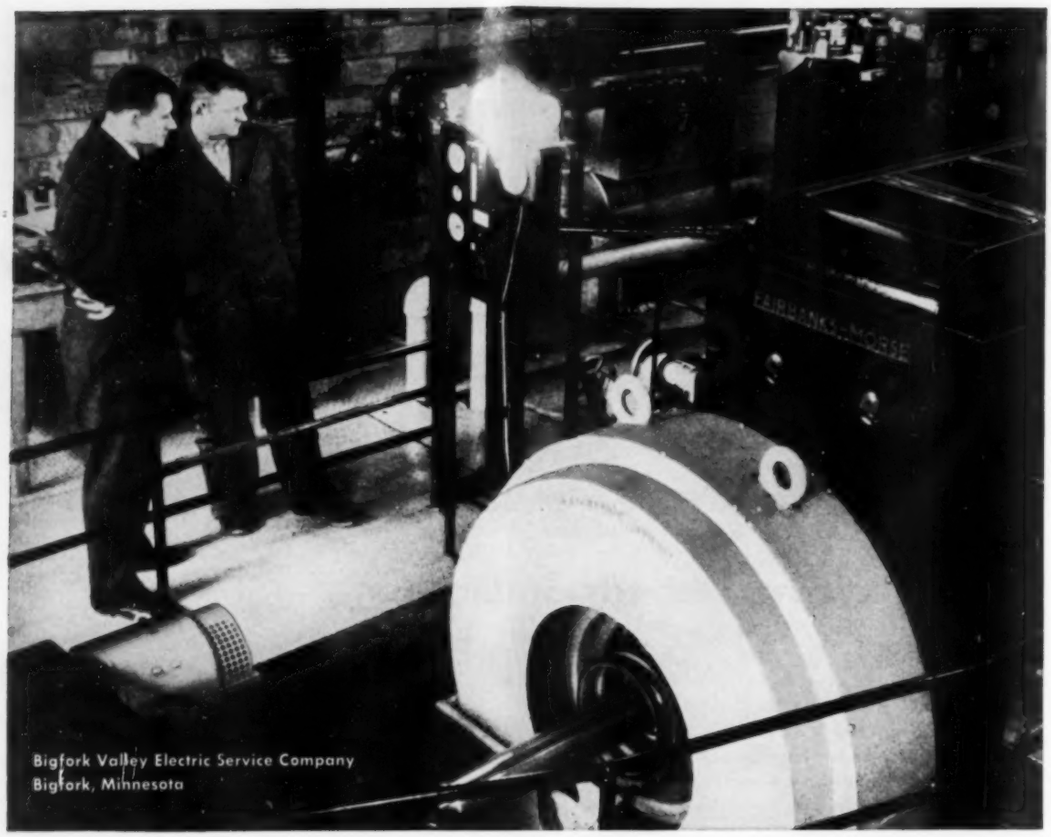
NORTHWOOD, MIDDX, ENGLAND:
B. W. Lansdowne
"Oaklands," Nicholas Way

DETROIT 39, MICH.:
James W. Brown
15936 Kinloch Road
KEnwood 2-1545

EVANSVILLE, IND.:
A. D. Burroughs
605 W. Maryland St.
HArrison 3-7313

FRONT COVER ILLUSTRATION

Three Cooper-Bessemer GMVC gas engine compressors, each rated 1000 hp at 300 rpm, in the Utica station of New York State Natural Gas Corp.

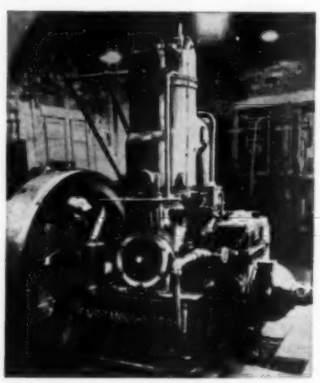


1/2 HOUR DOWN-TIME IN 6 YEARS WITH CITIES SERVICE LUBE OIL

This 300 KW generator supplies a major portion of the Bigfork power supply. Nearby is one of Minnesota's largest lumber mills which, during the cutting season, saws three to four million board feet of white pine. During this season the power plant operates at peak load and can ill afford down-time on a major piece of equipment.

For this reason, Bigfork relies on Cities Service DC-500 Lube Oil. Orbin Holt, of Bigfork Valley Electric Service Company states, "Cities Service has given us excellent technical advice on our lubrication practices, and we couldn't ask for better results than we have received with DC-500 oil. We have had only ½ hour down-time on this generator in six years and that wasn't a lubrication failure."

Cities Service DC-500 with its high level of detergency-dispersion and great anti-oxidation and anti-corrosion properties is typical of the complete line of diesel lubricants available for every type of service and all types of equipment. Expert technical assistance is at your call with experienced Cities Service Lubrication Engineers. Call the nearest office or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, New York.



Ancient one-cylinder generator was installed in 1929 and is still called on for its 35 KW output during peak loads. Careful maintenance and quality lubricants are credited for its long life.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

INTERNATIONALLY ACCLAIMED

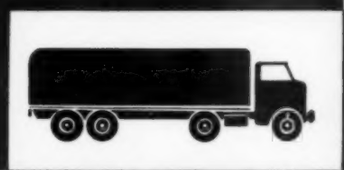
Schwitzer Products

Selected for Application of

FLUID FLOW

and

VIBRATION CONTROL



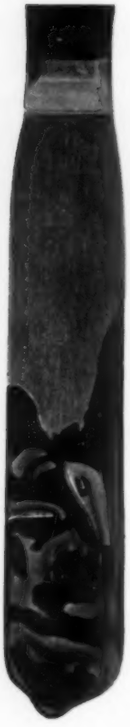
stay ahead with . . .

SCHWITZER
CORPORATION

INDIANAPOLIS 7, INDIANA U.S.A.

products with a new approach

- TURBOCHARGERS
- SUPERCHARGERS
- VIBRATION DAMPERS
- SHAFT SEALS
- FAN BLADES
- FAN DRIVES
- COUPLINGS
- WATER PUMPS
- HIGH EFFICIENCY FAN SHROUD ASSEMBLIES



These are tarry deposits removed from crankcase into which permanent-type anti-freeze had leaked.

What some fleet men say is their most serious and repeated engine problem

Permanent-type anti-freeze leakage into crankcase a cause of major maintenance headaches

By A. C. Davis and J. M. Miller, Sales Technical Service Department
Standard Oil Company

Both gasoline and diesel engines frequently suffer leakage which permits permanent-type anti-freeze to seep into the crankcase. When this happens, deposits form. Deposits vary from light, varnish-like films to heavy, black, rubber-like tar. The harmful effects of light varnish deposits can range from nil to plugging of rings, sticking of hydraulic lifters and valves and, possibly, sticking of pistons. In severe cases, heavy, black, rubber-like deposits tend to accumulate in the crankcase. Equally serious is the fact that the anti-freeze may remove the additives from the motor oil, causing them to settle out. Deposits resulting from permanent-type anti-freeze leakage are unwanted, and additive removal robs the engine of the full protective qualities of the motor oil and additives.

Identifying problem is difficult

One reason for the seriousness of the leakage problem is that it can go unrecognized until too late. The varnish-like deposits are similar in appearance to those due to lack of motor oil quality or to lack of additive in the motor oil. This is the type most frequently encountered. The deposits, due to heat and chemical action, bear no resemblance to the original anti-freeze and are difficult to analyze.

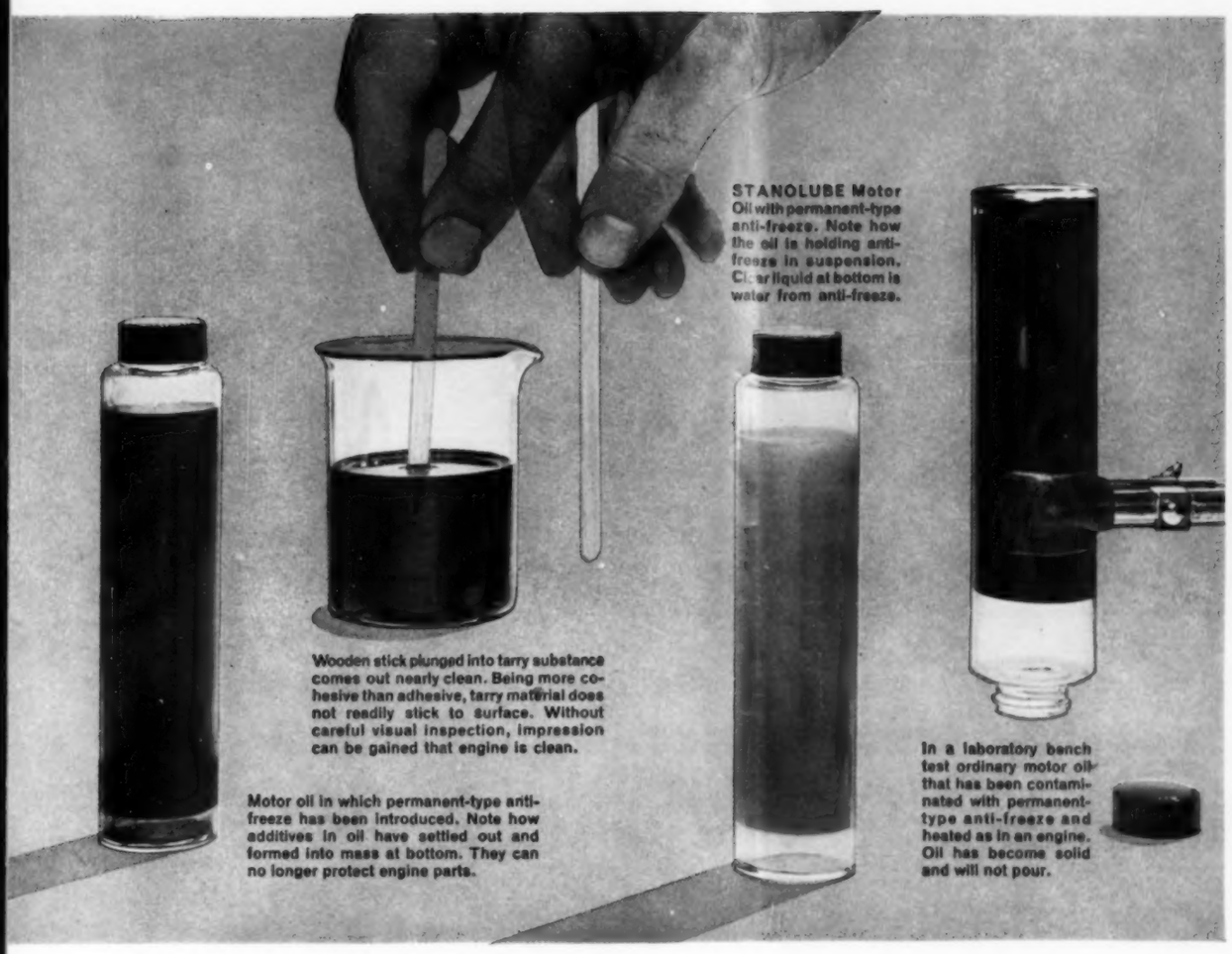
In general, anti-freeze contamination of motor oil goes unrecognized because permanent anti-freeze solutions are insoluble in oil. They settle to the bottom of the crankcase and usually are not included in a used oil sample. Extreme care in sampling is necessary to detect this contamination.

When heavy, tarry deposits occur and motor oil additives are mixed with the deposits, the deposits tend to stay in the crankcase. Frequently, on draining, the oil appears relatively clean—that is, it is less contaminated with carbon, soot and other oil-coloring materials. If such deposits are suspected, they may still be missed by probing because they do not readily adhere to the probe.

These factors can lead a skilled and competent maintenance crew, and an equally capable laboratory analyst, into believing there is no sludge in the crankcase or that there is no oil varnish due to contamination. If the crankcase is removed, however, the damage-causing, tarry-like deposits will be found.

Stop anti-freeze leakage to prevent deposits from occurring

Check head gasket for possible leakage. If leakage is occurring there, gasket should be replaced. In engines using "wet sleeve" type cylinder liners, the sealing rings and lands should be inspected for leakage. Where a synthetic rubber-based sealing compound is used over the sealing rings and lands, replace this coating whenever engine is disassembled.


STANOLUBE Motor Oil with permanent-type anti-freeze. Note how the oil is holding anti-freeze in suspension. Clear liquid at bottom is water from anti-freeze.
Wooden stick plunged into tarry substance comes out nearly clean. Being more cohesive than adhesive, tarry material does not readily stick to surface. Without careful visual inspection, impression can be gained that engine is clean.
Motor oil in which permanent-type anti-freeze has been introduced. Note how additives in oil have settled out and formed into mass at bottom. They can no longer protect engine parts.
In a laboratory bench test ordinary motor oil that has been contaminated with permanent-type anti-freeze and heated as in an engine. Oil has become solid and will not pour.

Anti-freeze affects different motor oils in various ways

The amount and nature of deposits is affected by the amount of anti-freeze leakage and the composition of the motor oil. Severity of operation is also a factor in the amount of deposits formed.

STANOLUBE HD-M and S-1 Motor Oils have demonstrated a unique ability to hold anti-freeze in suspension, minimizing deposits. Most important, the additives in STANOLUBE HD-M and S-1 are not readily removed by the anti-freeze.

Service suggestions

If used oil at drain time appears cleaner than expected, it should make one suspicious of the loss of additive. A mildly opaque oil often signals that water is present, but that additives remain in the oil. We know of no better method of protecting engines in winter than by the use of permanent-type anti-freeze. However, the possibility of leakage and the resulting damage to engine and oil that may occur, are good reasons for removing anti-freeze during warm weather.

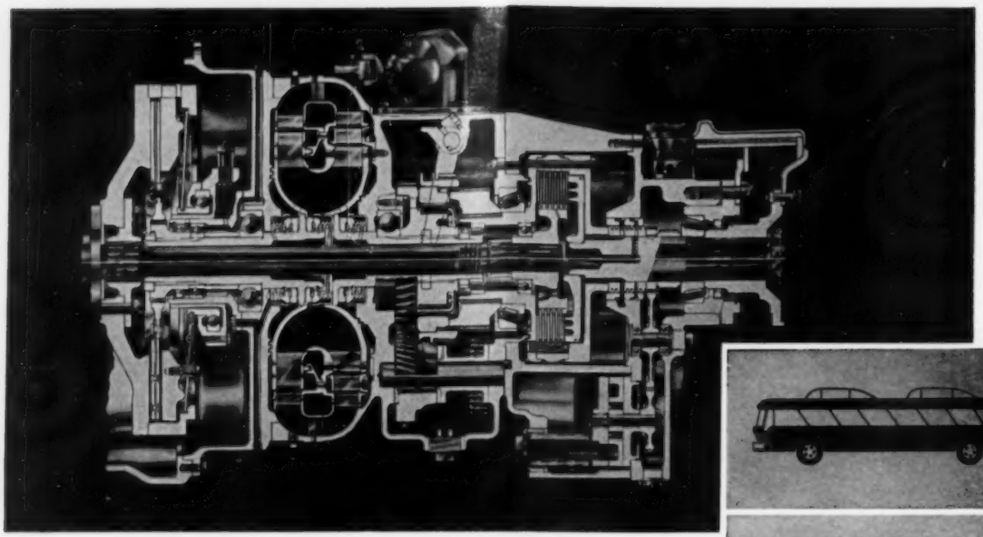
More facts

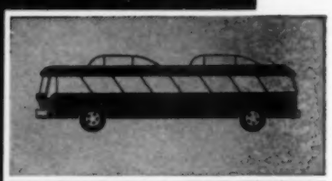
Get more facts about permanent-type anti-freeze contamination and about how STANOLUBE Motor Oils can help solve this problem. Inquire of your Standard Oil automotive lubrication specialist at any of the 48 district offices in the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

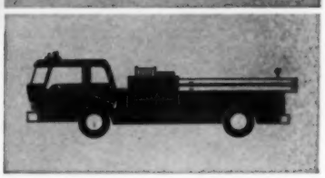
How to clean an engine contaminated by tarry deposits resulting from permanent-type anti-freeze leakage

1. Drain out all oil and remove oil filter; fill the crankcase with a mixture of about 3 qts. of SAE 10/W and 2 qts. of Butyl Cellosolve (obtainable from chemical suppliers); idle the engine for 30 minutes, noting the oil pressure; immediately drain the solution from the crankcase.
2. Add a flushing solution of about 3 qts. of SAE 10/W and 2 qts. of Kerosene; circulate the mixture at idling speed for 5 minutes; completely drain the system.
3. Install a new oil filter element and add fresh oil of the grade and classification required.

You expect more from **STANDARD** *and get it!*







Spicer 183 Turbo-Matic...

The Transmission That Thinks for Itself!

Just turn the ignition key and accelerate . . . the 183 Turbo-Matic does the rest. Acceleration is smooth and rapid from standstill to direct drive, regardless of load condition or driver skill. The mental and physical fatigue of professional driving is materially reduced. Drivers are fresher, more alert, all day.

In buses and emergency vehicles Turbo-Matic multiplies available engine torque by as much as 5.6 times to provide unexcelled power utilization for improved operating efficiency and minimum maintenance downtime.

Many American cities have discovered the operational advantages of the heavy-duty Spicer 183 Turbo-Matic transmission. Ask the Dana engineers to help you adapt it to your vehicles.

. . .

Write for your free copy of booklet No. 806, which describes the outstanding features of the Turbo-Matic transmission.

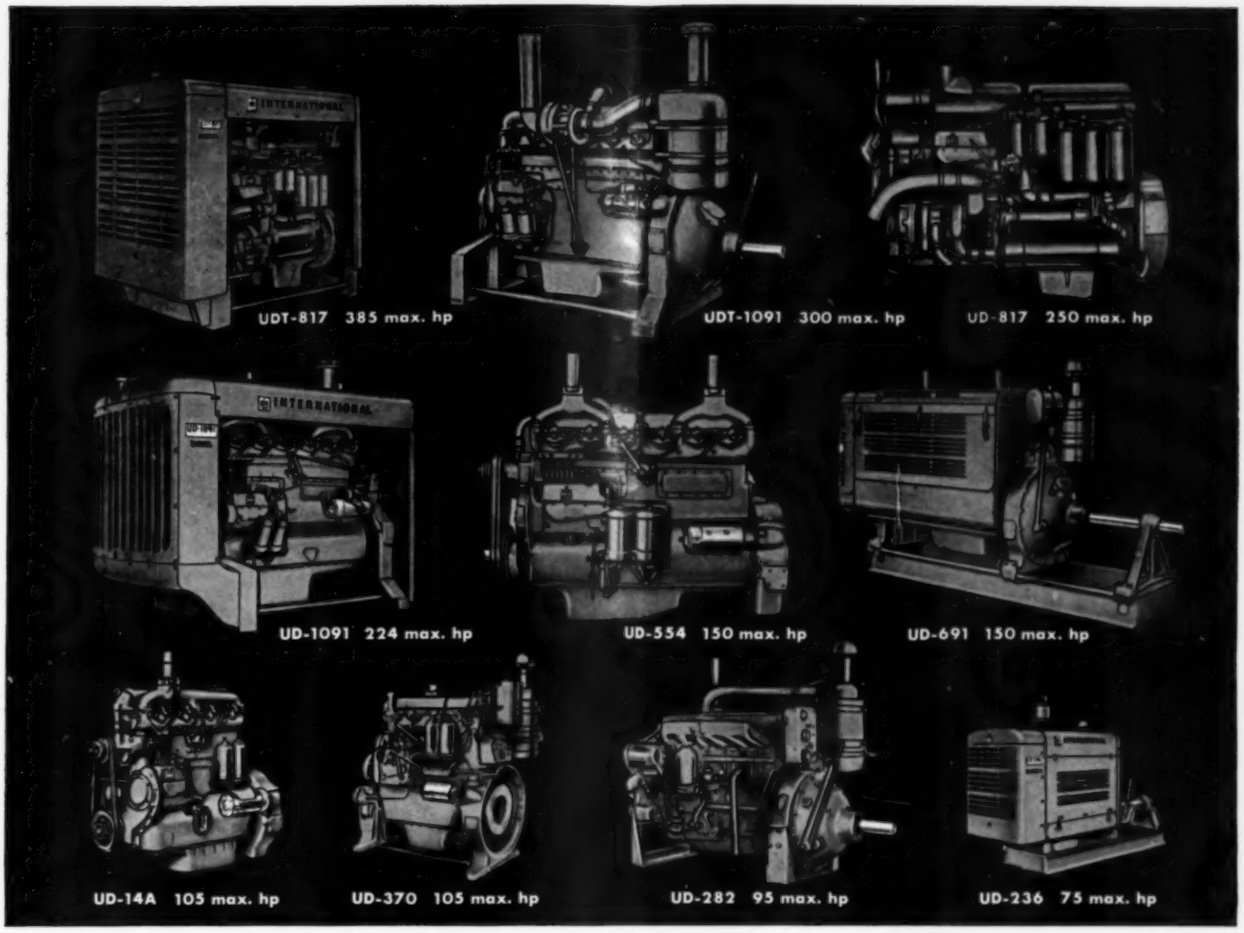
DANA Spicer

DANA CORPORATION

Toledo 1, Ohio

Serving Transportation—Transmissions • Auxiliaries • Universal Joints • Clutches • Propeller Shafts • Power Take-Offs • Torque Converters • Axles • Powr-Lok Differentials • Gear Boxes • Forgings • Stampings • Frames • Railway Drives

Many of these products are manufactured in Canada by Hayes Steel Products Limited, Merritton, Ontario


UDT-817 385 max. hp
UDT-1091 300 max. hp
UD-817 250 max. hp
UD-1091 224 max. hp
UD-554 150 max. hp
UD-691 150 max. hp
UD-14A 105 max. hp
UD-370 105 max. hp
UD-282 95 max. hp
UD-236 75 max. hp

Specify International and be sure your product's engine has

fastest payback power!

You can be sure of fast payback power in your product when it is powered by an International diesel.

International engineers with over 50 years of heavy-duty engine design experience have made fastest payback power the one common feature of all of these diesel engines through lowest cost operation, long-working stamina, thorough sealing, and minimum maintenance.

Ten sizes ranging from 75 to 385 max. hp. in 4 or 6-cylinder designs make it easy to match International diesel power exactly to your machines.

And all models are available from stripped engines to complete power units. A wide variety of accessory equipment including air cleaners, flywheels for leading makes of torque converters and clutches, torque converter coolers, air compressors, safety shut-offs, instruments and engine controls can be furnished.

Bases, radiators, hoods and dashes, clutches and power take-offs can be ordered for complete power units.

For additional product information or any type of installation assistance you might require, call or write International Harvester Co., Engine Sales Dept., Construction Equipment Division, Melrose Park, Ill.

International® Construction Equipment

International Harvester Co., 180 North Michigan Ave., Chicago 1, Illinois

A **COMPLETE POWER PACKAGE:** Crawler and Wheel Tractors . . . Self-Propelled Scrapers and Bottom-Dump Wagons . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Haulers . . . Diesel and Carbureted Engines . . . Motor Trucks . . . Farm Tractors and Equipment.

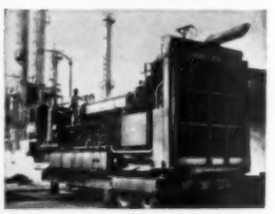
BENDIX FUEL INJECTION FEEDS LARGEST TRAILER-MOUNTED POWER PLANT

Rugged operating conditions demand utterly reliable performance. That's why the world's largest trailer-mounted mobile power plant, developed by White Diesel Engine Division for the government of Venezuela, is equipped with Bendix* Diesel Fuel Injection equipment.

The 1250 KW unit was designed by White for use as a weatherproof all-in-one power source on major construction projects. Mounted on a 39-foot trailer, the huge plant provides maximum power in a minimum package. Its fabricated steel engine drives a 12-ton generator and is equipped with an 11-foot cooling radiator.

First task of the new power plant will be to provide the power for construction of a 335-million-dollar, 750-acre petrochemical installation in Venezuela, encompassing more than 20 factory buildings. The entire area is being reclaimed from tropical forest and swamp.

Extreme conditions call for superior equipment. White specified Bendix Diesel Fuel Injection equipment.



When the plant is in position, the Autocar truck can be detached for other uses and the 16-wheel trailer leveled to provide a proper operating base.

* REG. U.S. PAT. OFF.

Scintilla Division
SIDNEY, NEW YORK

Bendix
AVIATION CORPORATION

Export Sales & Service: Bendix International Division, 205 E. 42nd St., N.Y. 17, N.Y.

New lightweight Cummins-built compressor so simple it can be serviced on the engine!

Single cylinder design reduces total parts by 50%
—moving parts by 30% over conventional 12 cfm compressors!

- *Greater dependability* Simplified, one piece air intake and outlet assembly, integral crankshaft and accessory drive increases operating life and efficiency.
- *More compact* Unit is 5 inches shorter and up to 20 lbs. lighter than conventional air compressors.
- *Fully tested* in automotive and industrial applications. New compressor has been proved with more than 3 million truck fleet miles and over 20 thousand off-highway hours.
- *Reduced maintenance* New Cummins Compressor can be serviced on the engine—by your mechanics if you desire—in only 20 minutes! Parts are available at all Cummins Distributor locations.
- *Standard on Cummins Diesels* All Cummins Diesels made after November 1, 1959, will carry the new compressor as standard equipment. However, your Cummins Distributor can install the new compressor on your present engine.

Cummins Air Compressor specifications:
Single cylinder. Air delivery—12 cfm. Bore and Stroke—3⅞ x 1.9 Weight—47-50 lbs.
Dimensions: Length—9-9¾". Height—12⅝". Width—7⅛".
Cooling—Water from engine!

CUMMINS

Cummins Engine Company, Inc., Columbus, Indiana

ELLIOTT TURBOCHARGERS INCREASE ENGINE POWER

50%

Unmatched Turbocharger Experience

Elliott, with 18 years of turbocharger background, has more experience in this field than any other manufacturer in the United States. Elliott covers the whole field of turbocharged engines.

Turbocharging gets more power out of any diesel or gas engine. Alcoa's Point Comfort plant had long been using Nordberg vertical radial engines to power pot lines (242 of them; 162 of these drive Elliott generators).

Turbocharging these engines took a little working out, but it resulted in increasing power output from 1330 to 2000 kw per engine.

ELLIOTT Company

TURBOCHARGER DEPARTMENT, JEANNETTE, PENNSYLVANIA

MB-2

Cut power costs with NORDBERG ENGINES

840 kw Nordberg diesel serving a midwest utility.

Two 2500 kw Nordberg diesels serving an eastern utility.

2285 kw Nordberg diesel, one of three in a southern utility.

FOR STANDBY SERVICE

If lack of sufficient power makes it difficult to hold generating costs "down," and standby reserve "up," it will pay you to investigate the advantages of Nordberg engines. These efficient prime movers are easily installed independent of existing power facilities, go on the line quickly, and generate low cost power under all load conditions.

FOR PEAK LOAD SERVICE

If your base generating station is having difficulty "topping the load" at an economical figure, follow the example of many utilities who have assigned peaking problems to Nordberg engines . . . and in doing so have also added desirable generating flexibility and standby protection while amortizing their investment through more profitable operation.

FOR BOOSTING VOLTAGE

If your load has grown beyond the capacity of the existing transmission system and if there is difficulty maintaining voltage in outlying areas, Nordberg engines can give you the increased capacity at low cost per kwh. These efficient units are easily installed, and can be readily tied into the line at strategic locations to boost the voltage.

We will welcome your inquiry and the opportunity to discuss the advantages of Nordberg engines for your specific power requirements. Write for further details.

© 1959, N. M. CO. P859

NORDBERG MANUFACTURING COMPANY • Milwaukee 1, Wisconsin

ATLANTA • CLEVELAND • DALLAS • DULUTH • HOUSTON • KANSAS CITY • MINNEAPOLIS • NEW ORLEANS • NEW YORK • ST. LOUIS
SAN FRANCISCO • TAMPA • WASHINGTON • TORONTO • VANCOUVER • JOHANNESBURG • LONDON • MEXICO, D. F.

Michigan-Ohio News

By Jim Brown

WOLVERINE Tractor and Equipment Co. of Detroit and Grand Rapids recently delivered two new International TD-25 crawler tractors to the Michigan Limestone Co. of Rogers City, Mich.

CYRIL J. Burke, Inc., Detroit, sold a 40 ton Northwest model 6 hoe to E. T. Brady & Son of Livonia, Mich. The new Northwest is equipped with a 1¾ cu. yd. bucket, Murphy diesel engine and will be broken in on a sewer job in Detroit.

ROMULUS Township Water Department has accepted delivery on a John Deere model 440 ICD tractor powered by a GM Diesel model 2-53 engine. The new tractor has an all-hydraulic dozer blade which the operator can angle, tilt, raise and lower without leaving his seat. The sale was made by R. G. Moeller Co., Detroit.

THE city of Saginaw has a new fully equipped Allis-Chalmers model HD-11-G tractor equipped with a TS-11 Tracto-shovel attachment. The tractor will be used as an all-purpose machine. It was purchased from Earle Equipment Co., Detroit.

THE Frank G. Hough Co., Libertyville, Ill., has announced a new four-wheel-drive, rubber tired tractor shovel with 5000 lbs. carrying capacity, the Model H-50. This loader is now in production and is available with diesel engine.

DALE Gretton of Berian Springs, Mich., has accepted delivery on a new International TD-9 tractor with Drott 4-in-1 attachment. Sale was made by the Grand Rapids branch of Wolverine Tractor & Equipment Co.

MODEL 175 Pettibone-Mulliken front end loader equipped with a 2¼ cu. yd. bucket and powered by a Hercules DD-339 engine was recently sold to the Northeast Construction Co., Detroit. The new loader will be broken in on a sewer job for the City of Southfield. It was sold by Cyril J. Burke, Inc., Detroit.

R. G. Moeller reports the sale of a 315 cfm Ingersoll-Rand air compressor powered by a GM Diesel 3-71 engine to Dearborn Excavating Co., Dearborn, Mich.

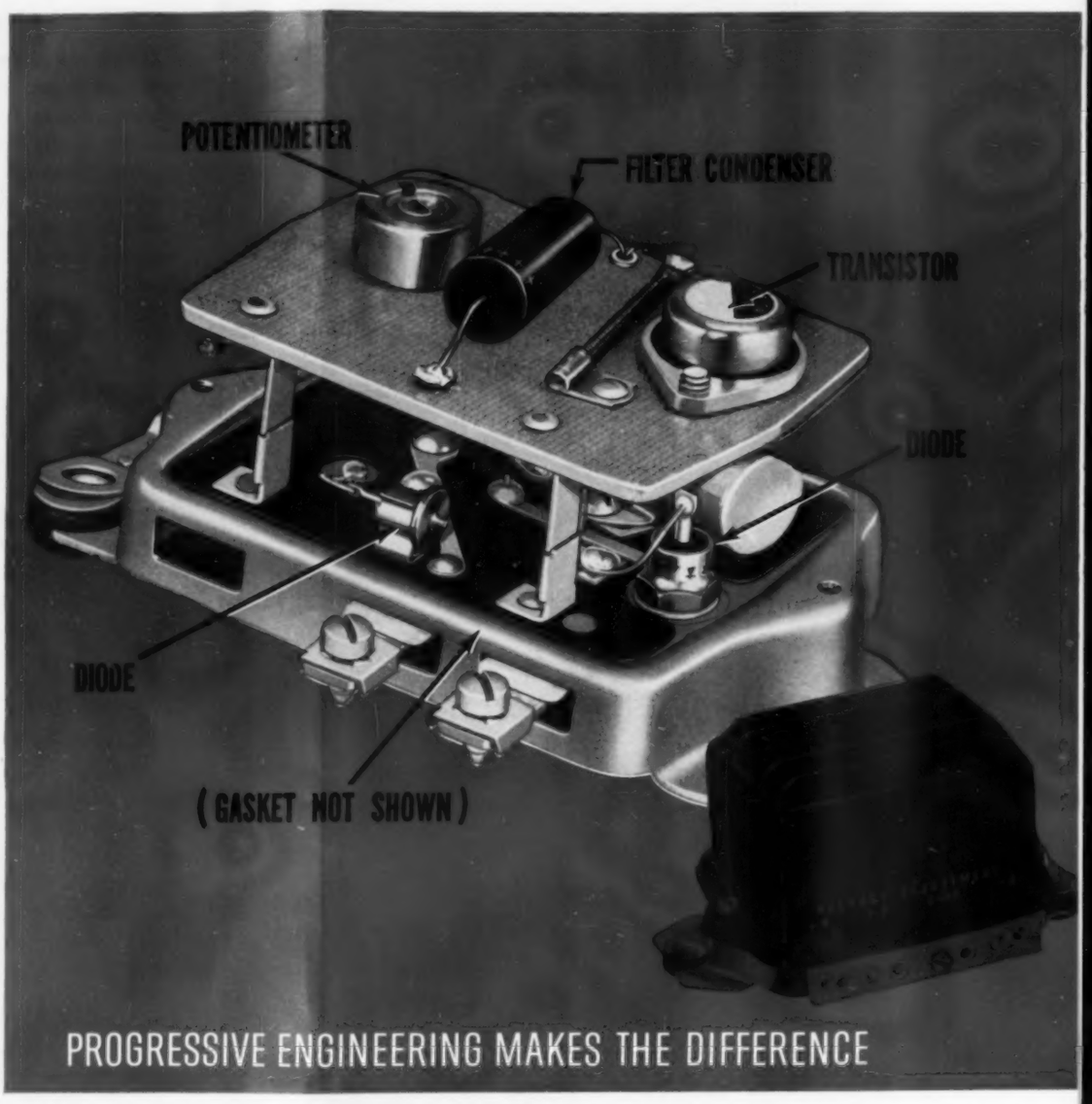
TWO Allis-Chalmers model HD-6-E crawlers were recently delivered to Light Weight Aggregate Co., Farmington, Mich. The new A-C's were equipped with 6-BE hydraulic dozer blades and were sold by Earle Equipment Co., Detroit.

FRED Grewe of Mt. Pleasant, Mich., has accepted delivery on an International model TD-9 equipped with hydraulic Bullgrader. The sale was made by Wolverine Tractor and Equipment Co. of Detroit and Grand Rapids.

INTERLAKE Iron Corp., Toledo, Ohio, is installing a Cummins model HS-6-I-TC diesel engine with torque converter unit in an Industrial Brownhoist model 8 locomotive crane. The engine will drive through a Twin Disc clutch. Sale was made by Cummins Diesel Michigan Inc., Dearborn, Mich.

THE Ford Motor Co. has accepted delivery on an Oliver OC-15 bulldozer powered by a Hercules diesel engine rated at 110 hp. The crawler was sold by Cyril J. Burke, Inc. of Detroit and will be used by the Ford Motor Co. in Argentina.

GUY Linville has been appointed district sales manager of the Detroit territory for Lorain power shovels, cranes and Moto-Loaders. He will cover parts of Michigan, Ohio, Indiana and Ontario.



PROGRESSIVE ENGINEERING MAKES THE DIFFERENCE

ONLY DELCO-REMY OFFERS FULL-TRANSISTOR

Designed for use with DELCO-REMY'S new self-rectifying a.c. generators

Now you can choose between two modern new Delco-Remy regulators—the most accurate available today. One is a full-transistor model, the other transistorized.

The FULL-TRANSISTOR REGULATOR has no moving parts and offers the ultimate in accurate electrical performance, durability and reliability. It is composed entirely of transistors, diodes, condensers and resistors, permitting higher field current for better generator performance. Constant voltage control is unaffected by temperature changes, vibration, or mounting position. A simplified external adjusting feature permits easy voltage setting for varying operating conditions. And this full-transistor regulator requires no periodic servicing.

The TRANSISTORIZED REGULATOR contains a single transistor and diode working in conjunction with a vibrating-type voltage sensing unit. The transistorized circuit

PENINSULAR Diesel Inc. of Detroit reports that it has installed a GM Diesel model 4171E engine in a GMC model 630 truck for Hybel's Produce Co. of Kalamazoo, Mich.

MONROE Excavating Co. of Monroe, Mich., recently purchased an Allis-Chalmers model HD-6-E with 6-BE hydraulic dozer blade. Sale was made by Earle Equipment Co., Detroit.

WOLVERINE Tractor & Equipment Co., Detroit and Grand Rapids, reports the sale of a Hough model H-90 Payloader equipped with 12-ply 20.5 x 25 tires and powered by a Cummins turbocharged model JT-6-BI engine. The new Hough was purchased by Aetna Portland Cement Co., Essexville, Mich.

DEARBORN'S Z. LeDuc has accepted delivery on a model 6 Northwest pull-shovel equipped with a 1¾ cu. yd. bucket and powered by a Murphy diesel engine. The new shovel will be used in sewer work near the new expressway in Farmington, Mich. It was purchased from Cyril J. Burke, Inc., Detroit.

THE Ford Motor Co. of River Rouge, Mich., has accepted delivery on an Allis-Chalmers model HD-21-A bulldozer for use in stockpiling coal. The new 21-ton 'dozer was purchased from Earle Equipment Co., Detroit.

CUMMINS Diesel Michigan Inc. of Dearborn, Mich., has installed a Cummins NHS-6-B 290 hp diesel engine in a model DC-7564TRBB Autocar for Atwater Trucking Co., Detroit. Atwater Trucking hauls gravel for Cronin Transit Mix Co., also of Detroit.

ELKIN Palmer & Son of Allegan, Mich., has a new GM Diesel model 5033 engine for his Bucyrus-Erie 60-L drilling rig. Engine supplier is Peninsular Diesel, Inc., Detroit.

Robert Bosch Names Boedecker as Vice President

The election of Mr. William Boedecker as vice president of Robert Bosch Corp., has been announced by Mr. George F. Krieger, president. Boedecker has been connected for many years with the Robert Bosch Corp., distributor in the United States for products manufactured by Robert Bosch G.m.b.H., Stuttgart, Germany.

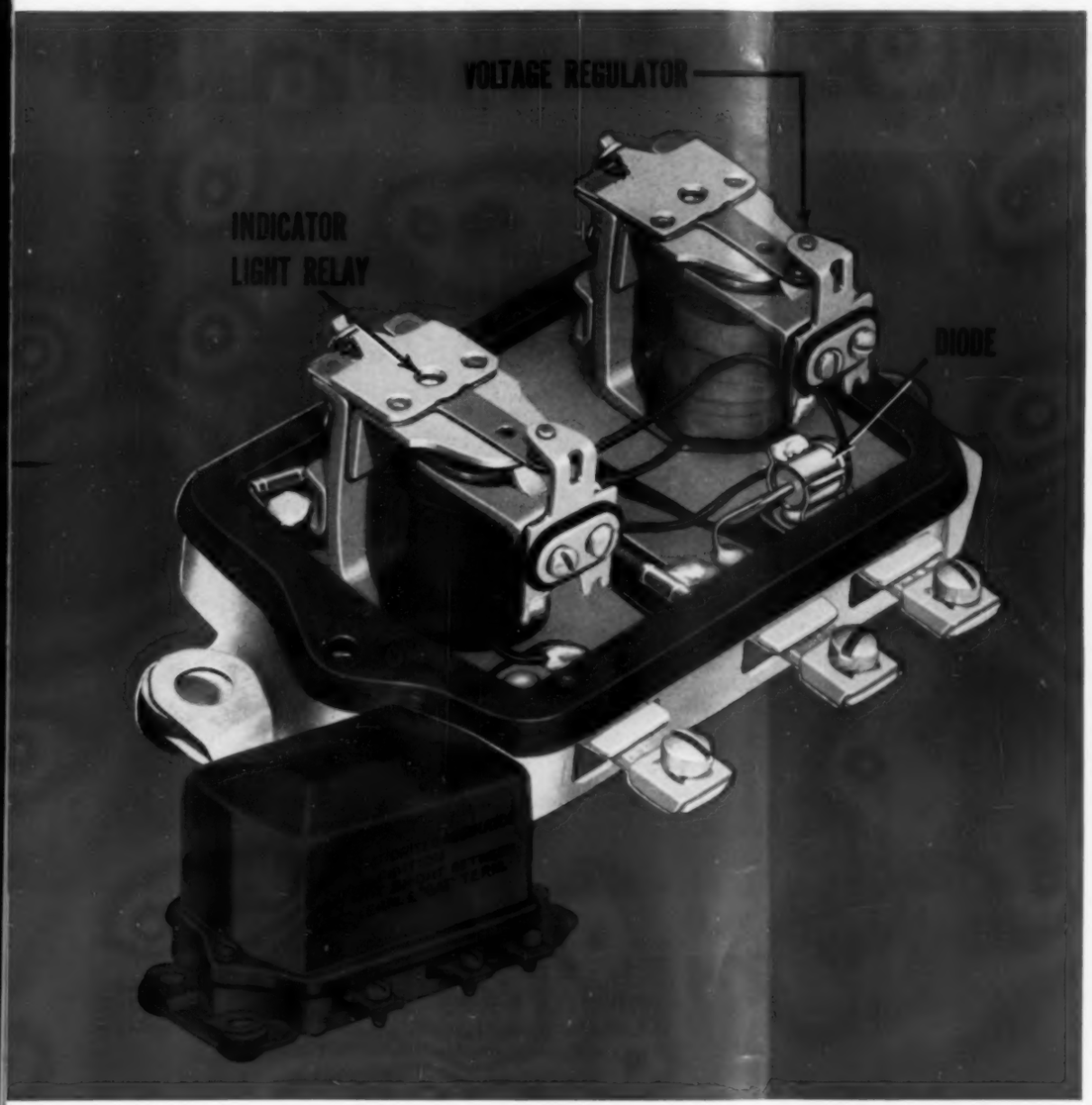
L. B. Hume Promoted by Cooper-Bessemer

Elevation of Mr. Laurence B. Hume to the position of assistant manager-power engine sales has been announced by The Cooper-Bessemer Corp. Hume will work directly under Mr. R. Spetka, manager of power engine sales, at Cooper-Bessemer's main office in Mount Vernon, Ohio. Hume will be responsible for the application and sale of gas, diesel and gas-diesel engines for use in all stationary power, marine and other mobile services. Associated with Cooper-Bessemer since 1940, Hume had been with the company's Washington (D.C.) sales office.

New Catalogs Offered By Waukesha Bearings

Waukesha Bearings Corp., Waukesha, Wis., is offering three new catalogs representing its complete line of bearings. W-1 catalog describes "sliding journal bearings" in different types of construction and materials, with sizes up to 45 in. W-2 catalog describes the Waukesha line of "tilting pad journal bearings" from 2½ in. through 12 in. Also included is a list of design variations. W-3 catalog describes the Waukesha line of "tilting pad thrust bearings" from 4 in. through 45 in., including special bearings of different materials and design. For further information, write Mr. Robert A. Hanson, Waukesha Bearings Corp., Dept. R, Waukesha, Wis.

ITS NEW



AND TRANSISTORIZED VOLTAGE REGULATORS

permits high field current for improved generator performance with low non-inductive current through the contacts for greatly extended contact life. Models are available for circuits containing either ammeters or indicator lights. All units are temperature compensated to better match battery voltage requirements.

Both the full-transistor and the transistorized models have the same mounting dimensions as standard regulators.

Whichever model you choose for your new vehicles or for replacement on present ones, you can be sure of reduced servicing and extended battery life. Available from your car or truck dealer or through the United Motors System.

FROM THE HIGHWAY TO THE STARS

Delco-Remy

ELECTRICAL SYSTEMS

GM GENERAL MOTORS

DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

Mid-West Diesel News

By **L. H. Houck**

EAST Wind, river tug owned by Massman Construction Co., Kansas City, Mo., has been repowered at Barbour Metal Boat Works. New diesel is a Cummins Model V-12-M, 425 hp at 1850 rpm. A new hydraulic steering system was also installed.

TWO 64-ft. all-aluminum personnel launches, 64 ft. 10 in. long, are being built for the Freeport Sulphur Co., New Orleans, by Peterson Builders, Inc., Sturgeon Bay, Wis. The craft carries 90 passengers and will be powered by two 12V-71 GM 2-cycle diesels. The boats have a speed of 23 mph.

BELL Lines, Inc., Charleston, W. Va., has bought 149 Macks in its fleet expansion and replacement program at a cost of $2 million. Tractors are Model B67-LT with Mack diesel engines.

MASSMAN Construction Co., Kansas City, which holds a contract for construction of a new U.S. 50 bridge over the Osage River near Jefferson City, Mo., put two new diesel-driven pieces of equipment on the job. One was a 38-B Bucyrus-Erie dragline with D326 Caterpillar engine and a 95 Model Northwest dragline with a Murphy diesel.

INTERNATIONAL TD-6 with Drott loader to W. H. Schumann Co., Ferguson, Mo., from Missouri-Illinois Tractor Co., St. Louis.

DIESEL Equipment Co., Wichita, Kan., has replaced a gasoline engine in a 15 kw generator set with a 3-53 GM Diesel engine for Bennett and Roberts Drilling Co., Russell, Kan.

MOORMAN Equipment Co., Cedar Rapids, Iowa, has installed a GM Diesel 2-53 engine on a Cedar Rapids portable bin for the B. L. Anderson stone quarry near Cedar Rapids.

KUDER Equipment Co., Fargo, N.D., delivered a LeTourneau-Westinghouse Tournapull powered by a GM Diesel 6-110 to William Collins & Sons of Fargo.

TWO 4D-85 Huber-Warco graders powered with GM Diesel 3-71's have been delivered to the Missouri State Highway Department, Kirkwood, Mo., by Burnup Equipment Co., Kansas City.

TWO Model 1000 Case tractors with Continental diesels to Excel Excavating Co., St. Louis, from Koste Machinery Co., Hazelwood, Mo. The units are equipped with Case automatic transmissions and high lift loaders.

INTERNATIONAL TD-9 with Drott loader to G. & R. Construction Co., Florissant, Mo., from Missouri-Illinois Tractor Co.

NEW towboat for Massman Construction Co. fleet, from Missouri Valley Steel Co., is the M/V *Hank*. The vessel is 50 ft. by 17 ft. by 5 ft. Power is two GM Diesel engines, 6071E's, 170 hp at 1700 rpm; reduction gear 3:1; propellers, Coolidge Atlantic type, 3 blade, 36 in.; engine keel cooled; Maxim silencers; pilot house governor control and reverse reduction gear controls, Sperry; fire protection, Walter Kidde Co.

INTERNATIONAL UDT17 diesel unit to Jonesboro Stone Co., Anna, Ill., for running a new CedarRapids crusher.

INTERSTATE 59, DeKalb County, Ala.: Harbert Construction Co., has eight Model 95 Payhauler International trucks, 27 ton capacity each, on two 10 hr. shifts daily, moving 8000 to 10,000 cu. yds., 70 per cent rock. Trucks are loaded with a Lima 3 cu. yd. shovel which has a Cummins diesel.

INLAND GM Diesel, Inc., has delivered

"WE'VE NEVER WORN OUT

Says C. Arthur Foss, who has 25 at work in the world-famous Foss Fleet

"Yes, sir, we have never worn out an Enterprise engine. We are still using the first one we ever bought, plus 24 others which power our tug boats," says C. Arthur Foss, Chairman of the Board, Foss Launch and Tug Company, Seattle and Tacoma. "We installed our first big Enterprise in 1937 in the *Anna Foss*. During the next 8 years, this engine ran 45,000 hours before being overhauled. Today it has run approximately 125,000 hours and is still going strong."

On the basis of the performance of its original Enterprise, the Foss Company and affiliates now operate 24 additional Enterprise Diesels – *3 times as many as any other make* – in its fleet. And these engines, which range from 200 to 1500 horsepower, are "turning in the same first rate performance!"

The Foss Fleet operates generally in the Pacific from the Equator to the Arctic Ocean, with extensive operations in the Pacific Northwest and Alaskan waters. Towing assignments range from railroad car ferries to oil and chemical barges, log rafts, sand, gravel and bulk cement barges, lumber and pulp chip cargoes. Other services include docking ships and participation in marine construction work of all kinds.

Top performance, such as the Foss Company gets from its Enterprise diesels, is available to you in any Enterprise model you select. So when you are considering a new engine, talk with your nearest Enterprise Marine Diesel Engineer. Models from 73 to 7703 H.P.

DEPENDABLE ENGINES

ENTERPRISE
engine & machinery co.

Subsidiary of General Metals Corporation
18th and Florida Streets, San Francisco 10, California

Boston • Chicago • Jacksonville • Kansas City • Los Angeles • Minneapolis
New Orleans • New York • Pittsburgh • Seattle • St. Louis • Washington, D.C.

and installed a GM 4-53 diesel in a White 3000 Tilt-Cab for Hillside Transit Co., Milwaukee.

SMITH Lumber Co., Kamas, Utah, has taken delivery of a new No. 540 Pettibone-Mulliken "Cary-Lift" with a 3-71 GM Diesel engine.

RED Stone Co., Lexington, Mo., has put a new No. 41 Northwest shovel to work in the quarry. Engine is a 4-71 GM.

GM Diesel 4-71 engine from Inland GM Diesel, Inc., to Consumers Co., Milwaukee, for use on a primary crusher.

INGERSOLL-Rand Drillmaster drill with 6-71 GM Diesel engine to Casper-Stolle Quarry, East St. Louis.

West Coast News

By James Joseph

DEDICATED recently: Long Beach, California's Compressor Plant No. 6, powered by four 550 hp Clark HLA gas driven reciprocating compressors. The plant's octagonal design has been called one of the country's most unusual.

FOR oil well logging operations in Venezuela, 10 American MARC AC-1 and AC-2 engines (7 bhp and 16 bhp, respectively) to Gee-Mee Supply Co. S. A., Maracaibo, Venezuela.

DELIVERED: to Cockran Towboat Co., San Pedro, Calif., to repower its tow boat *Vivo*, a GM Diesel 6-110 engine. Conversion by Anderson-O'Brien Co., San Pedro.

GUYMAS, Mexico's Aturo Morales, S. A., has taken delivery of three American Marc 3 kw generator sets (powered by AC-1 air-cooled engines) for ranch irrigation application.

POWERING Disneyland's new submarines are eight DOO24M M.A.N. diesels driving 15 kw Westinghouse generators, supplying both motive power for the amusement subs and air conditioning. Two other M.A.N. DOO24M's are used as standbys.

HUBER-WARCO model 6-0 motor grader, powered by a 3-71 GM Diesel engine, has been delivered to the city of Compton, Calif.

CONTINENTAL Trailways Inc., Dallas, Tex., has purchased 50 additional (total: 150) M.A.N. D1548MT automotive engines, 240 hp at 2000 rpm, to power new Trailways buses. M.A.N. Pacific, a division of Wilbo Industries, will service and supply the carrier parts.

FOR Camdrill International, with head offices in Los Angeles, four Lister-Blackstone diesels (three LD-1's and an HA-3, 3½ and 30 hp respectively) for oil rig service in Africa. Sale by Industrial Engine Service, Los Angeles.

TRUCKEE, California's Fredrickson and Watson Construction Co., has purchased two new Blaw-Knox model 34E concrete pavers powered by 6-71 GM Diesel engines.

CHINO, California's I. W. Brooks Co. (construction) has taken delivery of a TD427 Continental diesel (109 hp at 1700 rpm) to repower a Gradall model 2460 excavator.

MONTEBELLO, California's N.A. Artukovich, contractor, has purchased a Lister-Blackstone LD-1 to repower a domestic double diaphragm pump. Sale by Los Angeles' Industrial Engine Service Co.

CONTINENTAL Emsco Mfg. Co. of Houston bought four 50 kw ac generator sets from Stewart & Stevenson Services, Inc., Houston. The units are model 3 GD 53C's, powered by series 71 GM Diesel 3 cylinder diesels.

AN ENTERPRISE DIESEL!"

Seven of the Foss workboats powered by Enterprise Diesels line up for a family picture. Boats underway and at work are pictured below. The *Anna Foss*, in which the first Enterprise was installed, has already run 125,000 hours. (Far left below.) Total of 22 Foss boats are powered by 25 Enterprise Engines—3 times as many as any other make in this fleet.

Why you need AiResearch turbocharger control systems

The two components of the AiResearch turbocharger control system are a speed sensor and an exhaust by-pass valve. They control the speed of exhaust-driven turbochargers by modulating the amount of engine exhaust used.

The AiResearch turbocharger control system delivers more air to the turbocharged engine automatically when needed. This more than doubles the torque rise and gives the engine much greater lugging ability under heavy loads.

AiResearch is the leader in the development and production of turbocharger controls for all major diesel engine applications as well as air-cooled turbochargers for diesel engines from 50 to 700 H.P. Your inquiries are invited.

Reduced fuel consumption

•

Smoking eliminated

•

Longer engine life

•

Lower maintenance costs

•

Shorter running time

•

Better engine lugging

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

FARM USE OF DIESELS INCREASES

Only 6.3% of Agricultural Tractors Produced by U.S. Manufacturers in 1952 Had Diesel Engines; Total Rose to Startling 21% in 1958; Number of Diesel Models Increases

By KENNETH E. HUDDLESTON*

LONG a pillar of power in many fields, the diesel engine is fast adding agriculture to its long list of conquests. In 1952, only 6.3 per cent of the total United States production of agricultural tractors was diesel; in 1958 this percentage soared to a startling 21. The diesel's increase in agricultural wheel-type tractors has been even greater. In 1952, 5.7 per cent of agricultural wheel-type tractors was diesel; in 1958 this share for diesel had increased to 23.2 per cent.

This conquest of agriculture has been underway for a long time. As far back as the early 1900's, farm equipment engineers conducted extensive research work to produce moderate cost engines capable of giving efficient operation and satisfactory performance on low grade fuels. The constant search for better thermal efficiency and improved engine torque kept these engineers continuing the research, which finally paid off with the increased use of diesel engines in agriculture.

The first big breakthrough for diesel engines in agriculture came in the early 1930's, when track-type (crawler) tractors which were called on to overcome special soil conditions introduced the advantages of diesel operation to the farm field. Even during the depression, reception continued to grow—more and more diesel engines were being used for tractors, sawmills, cotton gins, rock crushers, irrigation pumps and, more recently, combines and corn pickers. This appears to be only the beginning. Full-line U. S. farm equipment manufacturers (tractors and implements) increased in one year—between 1957 and 1958—their number of models of diesel wheel-type tractors by more than 60 per cent. All of these manufacturers produce diesel and gasoline wheel-type agricultural tractor equipment.

Mr. Carl L. Hecker, president of The Oliver Corp. and a member of the executive committee of the

*Director of Public Relations, Farm Equipment Institute, Chicago, Ill.

Working on a European farm, this International Farmall Model M tractor is equipped with a Perkins L4 (TA) diesel engine.

Turning over ground is a 6 plow Oliver 990 GM tractor. It is equipped with a 3 cylinder, 2 cycle GM Diesel engine with 213 cu. in. displacement.

Farm Equipment Institute, the association of agricultural and power equipment manufacturers, said recently that diesel farming had come of age upon the farms of America and the entire world.

"With constantly rising costs of all types—both labor and material," Hecker said, "all possible emphasis is being placed upon aiding the farmer to reduce every element of those costs. As farms increase in size, the opportunity to utilize the diesel engine, with its lower cost of fuel per horsepower hour, immediately gives the farmer equal opportunity to reduce his fuel costs, which are an important part of his material costs. And as more diesel engines are used on our farms, quantity production will lower the differential cost of the gaso-

Plowing 15 ft. wide with a disc plow on a South Dakota farm is this Minneapolis-Moline GVI tractor. It has a 6 cylinder, 85 hp Moline diesel engine.

line and diesel engine, making those savings possible even in tractors of lower horsepower."

Officials at Deere & Co. said that use of the diesel would continue to grow. They listed the following reasons why farmers who buy diesels prefer them over gasoline or LP gas tractors: 1, lower fuel cost; 2, annoyance of attempting to obtain fuel tax re-

A 6 row cultivator is pulled through a field by a John Deere 730 diesel tractor equipped with a Deere 2 cylinder, 4 cycle, 58 belt hp diesel engine.

Driven by a 4 cylinder diesel engine, this Case 800 tractor pulls a plow. Engine, with 4⅛ in. bore, 5 in. stroke and 267 cu. in. displacement, is rated at 57 bhp.

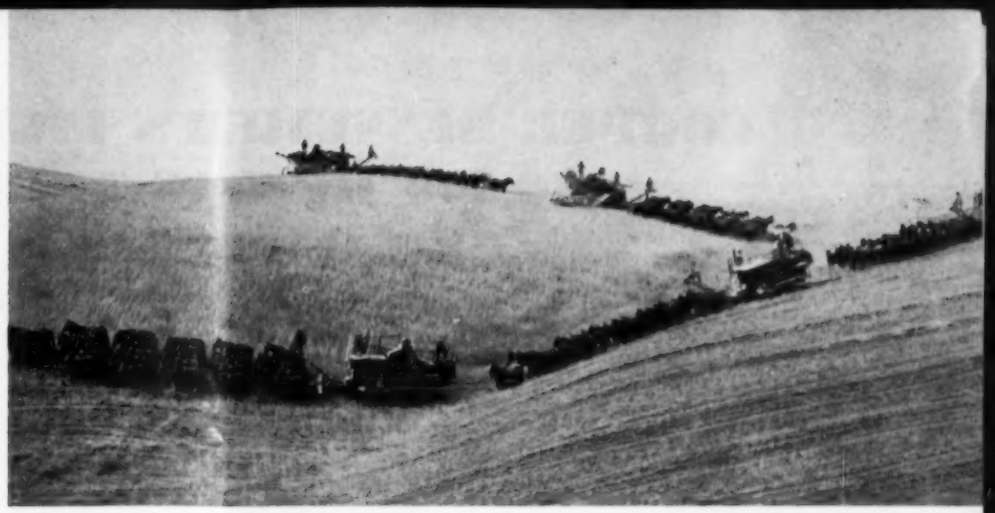
bates for non-highway use of gasoline is eliminated; 3, because fewer gallons are consumed, servicing time is reduced (no mid-day refueling); 4, good diesels have better "lugging ability" at faster speeds and give better performance than good spark ignition engines of the same horsepower rating; 5, pilferage is a factor in some situations—diesel fuel doesn't work in automobiles; 6, higher original cost is partially absorbed in depreciation write-off.

The higher cost of the diesel engine is the major reason why the farm equipment industry has not utilized the diesel faster. Educational forces in U. S. agriculture have clearly explained to farmers how they could determine when it pays to buy a tractor with a diesel, gasoline or LP gas engine. It has been merely a matter of mathematics. Farmers have computed cost of fuel in their agricultural area, number of hours of tractor usage a year, the gallons of diesel, gasoline or LP gas fuel which would be used, overhead, and maintenance. Certain factors of this formula have changed.

Competition among the tractor manufacturers is sharp in their announcements of breakthroughs in diesel tractor manufacturing economies. One agricultural tractor manufacturer recently announced that it would market a new line of diesel tractors in December, designed to more than compete with the agricultural diesels being imported from Europe. Credit for development has been attributed to improved design and to high precision tooling. Another manufacturer made this report recently:

"Our engineers and manufacturing men have done something our industry has been attempting to do for a long time—cut the cost differential between diesel and gasoline powered tractors to provide economical diesel power at minimum cost. The cost 'breakthrough' came by redesigning some components of the high-volume gasoline 4-cylinder tractor engine so that many of its parts could be used for a diesel engine. These economies of volume production and interchangeability are being passed on to the user."

Do farmers like their diesel tractors? One manufacturer was told by a Duncan (Miss.) farmer: "My new diesel tractor is lighter than the one we



Plenty of live horsepower was needed to pull these Holt sidehill combines in Washington in the years before the self-propelled combine took over. Dieselization of the American farm is continuing at a rapid rate.

made the comparison with, but my tractor is doing the same work on one third less fuel, six quarts less motor oil per change and tires that cost only three fourths as much."

A New Liberty (Iowa) farmer told another manufacturer: "We haven't had the new diesel long—but it has surely lived up to its reputation for fuel economy. When we plowed this spring it used just over two gallons of diesel fuel per hour at 15.2 cents per gallon. Last year, we used four gallons of gas each hour at 23 cents a gallon to do the same job. That represents a savings of more than $5 a day in fuel alone."

Diesel farming has come of age to contribute to overall farm mechanization—power farming which is saving farmers 10 billion man-hours a year. As they lift the curtain on new models for 1960, look for more dramatic announcements by farm equipment manufacturers of the use of diesel engines. The diesel appears to have a good future in the agricultural picture.

Using a 15 ft. disc, this Allis-Chalmers D-17 tractor with a 6 cylinder, 53 bhp D262 A-C diesel engine is harrowing an Arkansas rice field.

A Massey-Ferguson 95 tractor pulls a wide-level disc harrow over rolling wheat land. This tractor is equipped with a 6 cylinder, 425.5 cu. in. Moline D-425 diesel engine.

COOPER-BESSEMER'S LIGHTWEIGHT 10,500 HP GAS TURBINE

Experimental Unit Now Being Built for Installation by Columbia-Gulf Transmission Co. Turbine Concept Is Unique; Includes Modified Pratt & Whitney J-57 Jet Engine

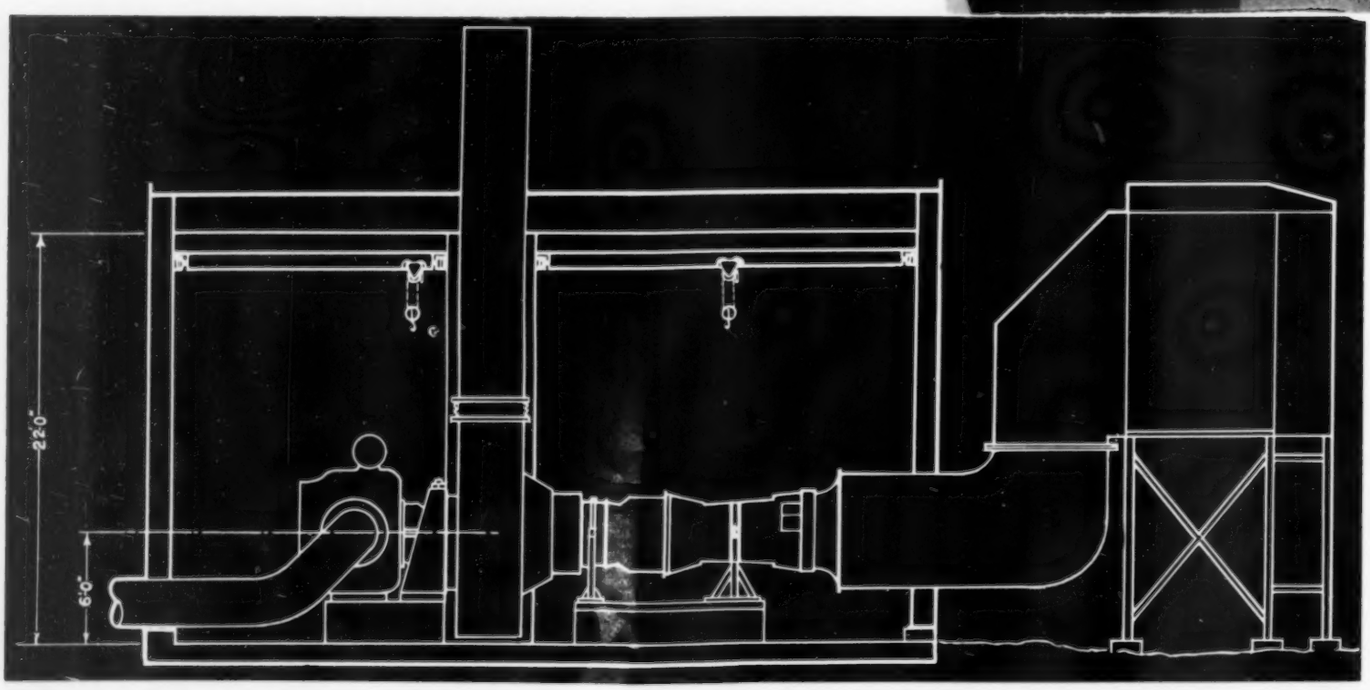
By ROBERT E. SCHULZ

IN what might well be termed one giant step, Cooper-Bessemer Corp. has entered the field of industrial gas turbine manufacture. Here at the company's headquarters in Mount Vernon, I met with Ralph L. Boyer, vice president and director of engineering, and his associates and discussed this adventure into a new prime mover field. The RT-248 gas turbine is as unique in its concept as it is versatile in application. Basically it embodies a modified aircraft jet engine whose thrust drives a power turbine to produce 10,500 hp at 5000 rpm.

The new experimental gas turbine was announced a few days ago jointly by E. L. Miller, president of Cooper-Bessemer, and L. C. Mallet, general manager of Pratt & Whitney Aircraft. Almost simultaneously with this was the announcement by Sy Orlofsky, vice president of Columbia-Gulf Transmission Co. that the first of these jet powered Cooper-Bessemer gas turbines would be installed, pending FPC approval, at that pipe line company's Clementsville (Ky.) station. Target time for installation has been tentatively set for Spring of 1960.

According to Boyer, Cooper-Bessemer has been studying the gas turbine for some 10 years, but began development work[6] actively with Pratt & Whitney in 1958. The jet engine selected for modification is P & W's J-57, which is the mainstay of America's commercial jet aircraft fleet powering, among others, the Boeing 707 and the newer DC-8. It is also the power plant of advanced military aircraft which is further indicative of its reliability. To date, approximately 18,000 of the J-57's have been built. While it normally burns conventional jet fuels, the J-57 has been converted to burn

Based on discussions with Cooper-Bessemer engineers, DIESEL AND GAS ENGINE PROGRESS produced this artist's conception of how the RT-248 gas turbine might be applied in gas pipe line compressor service. Large intake air filter is at right. Simple chain type hoists would be used because of the light weight of the gas generator. Dimensions are estimates.



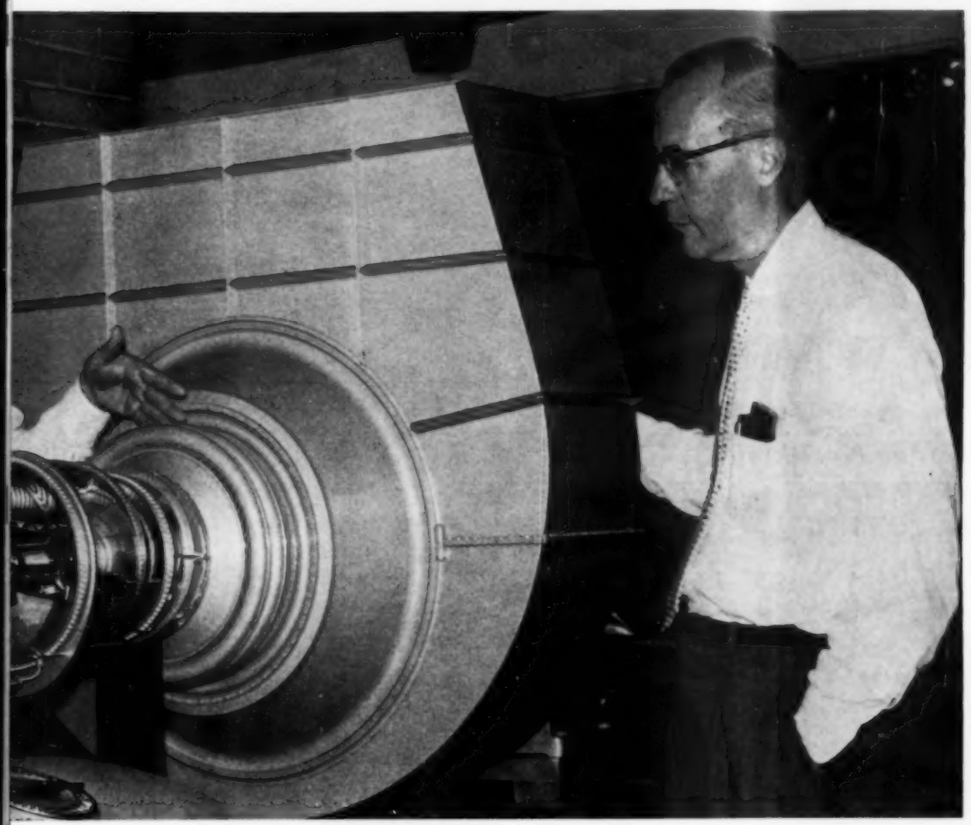
natural gas taken directly from the main pipe line. In overcoming this and other technical obstacles, Boyer saluted Pratt & Whitney for its fine cooperation. All work of this type has been conducted at P & W's multi-million dollar Willgoos research and test facility outside Hartford, Conn.

First test data indicates that the new turbine will have a thermal efficiency of 25 per cent which is comparable to gas turbines currently in industrial and pipe line service. With gas generator (J-57) and power turbine, the new RT-248 will weigh approximately 25,000 lbs., which on a weight per horsepower basis is very attractive in the larger gas turbine field. Looking at the two principal components, the modified J-57 engine requires a simple foundation and will be installed about as shown in the illustrated station drawing. It is coupled to the power turbine with a bellows expansion type flange (there is no mechanical drive connection between the J-57 and power turbine). From the air intake end, the J-57's basic components are: 9-stage axial low pressure compressor; 7-stage axial high pressure compressor; combustion chamber; 1-stage high pressure turbine; and 2-stage low pressure turbine. Shafting is concentric and a cranking motor drives the high pressure shaft for starting. The J-57 operates at a 10:1 compression ratio, a primary factor in achieving its 25 per cent thermal efficiency without regenerator. Cooper-Bessemer will hold temperatures in the gas generator to 1400°F. which will result in an exhaust temperature from the power turbine at atmospheric pressure of 695°F. The power turbine now being built is essentially a two-stage unit. The lower base is alloy cast iron with the upper base or housing fabricated steel. Of the total gas turbine unit, the power turbine represents approximately 80 per cent of the weight. In the experimental installation by Columbia-Gulf, the RT-248 turbine will drive a centrifugal compressor through a gear-type coupling.

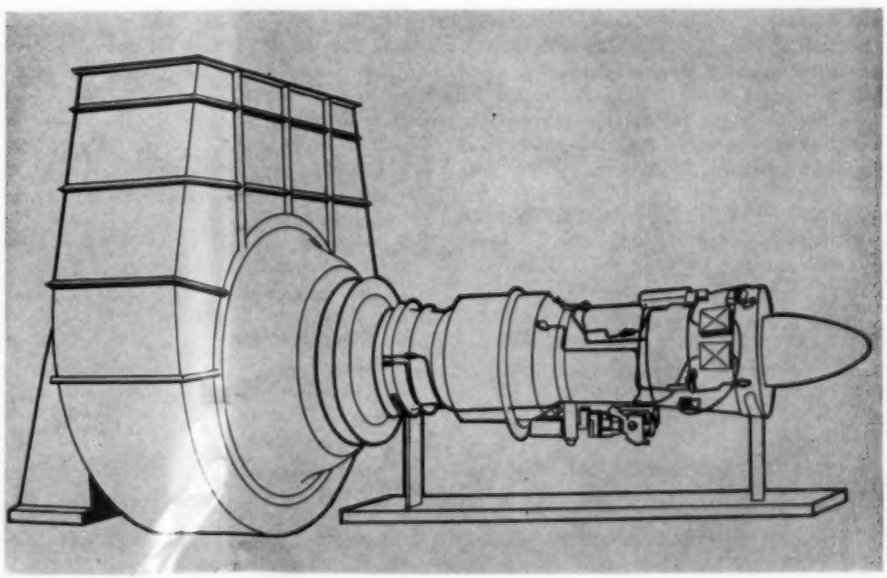
In discussing the Clementsville installation, Boyer emphasized, "the turbine, as well as the station, must be considered from an experimental viewpoint. Certainly many factors point to success, but there is a great deal of testing to be accomplished in the coming year." At Clementsville, the turbine will be housed in a new building adjacent to the present station which has seven Cooper-Bessemer reciprocating compressors. It too will be remotely controlled. As a matter of fact, the RT-248 lends itself readily to this type of control because of a more simplified starting procedure and few temperature and pressure check points. "Equally important," Boyer stated, "because of its compact size and light weight, we anticipate definite economies in the area of installation and maintenance costs." In typical service, it is expected that only minor maintenance will be performed at the site.

At overhaul time (expected 8000 hrs.) the gas generator unit, weighing approximately 4000-5000 lbs., would be removed and a spare or replacement unit set in place. A conservative estimate for changing the J-57 is four hours considering that the airlines are able to replace a comparable jet engine in some 45 minutes.

While concentrating directly on natural gas pipe line application at this time, Cooper-Bessemer believes the RT-248 is applicable for crude or products pipe line pumping, electrical power generation, marine propulsion and for general power service in chemical and petro-chemical processing. The Mount Vernon company, however, will not enter production of the RT-248 until the first unit has thoroughly proved itself.



Looking over a model of the RT-248 gas turbine at the Mount Vernon plant are these Cooper-Bessemer officials: From left, C. Horace Sanders, Southwest District Manager-Dallas; Eugene L. Miller, President; and Ralph L. Boyer, Vice President and Director of Engineering.



The 10,500 hp RT-248 gas turbine has two principal components—the modified Pratt & Whitney J-57 engine, and the Cooper-Bessemer power turbine. Note simple foundation and bellows type connection between the two units.

NEW *ALASKA STANDARD* PLIES TRICKY WATERS

Turbocharged 8-Cylinder Nordberg Diesel Engine, 1700 HP at 500 RPM, Drives 255 ft. Long Tanker

By KENNETH R. MacDONALD

WATERS off Alaska, considered among the trickiest in the world to navigate, will be the operational area for Standard Oil Company's newest diesel driven tanker, the *Alaska Standard*. The ship, second to bear the name of *Alaska Standard*, was launched last summer at Portland, Ore., and christened by Mrs. William Egan, wife of the first elected governor of Alaska. Gov. Egan also was present during christening of the 255 ft. long, 2600 ton tanker. The new tank ship replaces a ship of the same name, which has been in service in Alaskan waters for 36 years.

Built by the Albina Engine & Machine Works of Portland, the *Alaska Standard* is owned by Standard Oil Co. of California and will be operated by its marine subsidiary, the California Shipping Co. The vessel is powered by a Nordberg model FS-138-HSC, Supairthermal diesel engine, 1700 hp, 500 rpm, 4 cycle, 13 x 16½ in., working through a DeLaval-Hindmarch model M2WR-8 reverse reduction gear with a 5:1 ratio. This large reverse reduction gear application was selected to provide a type of drive closely approaching the electric drive in the original *Alaska Standard*.

The engine is connected to the reverse reduction gear through a Holset torsional damping coupling and the gear is attached to the propeller shaft, which is fitted with a Nordberg pneumatically actuated brake. Engine starting, speed control, clutching and declutching and the attendant brake action are all controlled through a Westinghouse Air Brake system for single lever control, with stations in the engine room and the pilot house. The engine is started by engine room personnel on signal from the bridge and operates at approximately one half rated speed. With control in the neutral position and the engine operating, the reverse reduction gear is declutched and the shaft brake set so that the propeller will not revolve even in the fast waters of some Alaska harbors.

Movement of the single lever control into either the ahead or the astern position simultaneously releases the shaft brake and energizes the ahead or the astern clutch. The engine picks up the propeller load and turns it at a speed corresponding to minimum speed set on the engine. As the control lever is advanced, an air signal to the Woodward PG governor advances the engine speed and the corresponding propeller speed to the maximum setting of the control lever and maximum speed of the engine. Because of the large propeller diameter and the mass of the ship moving at 13 knots, the air cooled shaft brake relieves the load on the clutches and the engine for "crash reversals". This gives the propulsion unit charactertistics comparable to electric drive.

The main engine lubricating oil system consists of a lubricating oil sump tank with Sier-Bath positive displacement motor driven pumps. The scavenge and pressure pumps are installed in duplicate, giving 100 per cent standby. De Laval IMO pumps furnish oil for the gear and couplings. Engine oil for lubrication is drawn from the engine sump and is discharged into the lubricating oil service tank. The lubricating oil pressure pump takes its suction from the service tank, discharging oil through an Air-Maze full flow cleanable-type filter and a Winslow element-type bypass filter to the Ross lubricating oil cooler and thence through a Purolator cleanable-type final filter to the engine system.

The gear lubricating oil is contained in the sump of the gear, which is fitted with stainless steel heating coils to maintain gear lube oil temperature at 90° F., regardless of the ambient or sea water tem-

perature. The IMO pumps take their suction from the gear sump and discharge through strainers and filters to the supply lines to the gear clutches and the gear itself. Control is arranged on these pumps so that if one pump fails for any reason, the other immediately starts to maintain the integrity of the clutches and lubrication to the gear. Engine and gear cooling is provided by three motor driven Aurora centrifugal pumps—one for sea water, one for jacket water and the third manifolded as a standby for either pump.

Amot thermostatic control valves provide temperature regulation for both jacket water and lubricating oil. A Fulton Sylphon temperature regulating valve with adjustable control is provided for controlling the temperature of the intercooler water. The Westinghouse Air Brake control devices are located on the engine, gear and brake, the engine room control stand and a pilot house control stand in the wheel house. The master intelligence and actuating devices are located on one board forward of the main engine. Air for these controls is provided at reduced pressure from the starting air system. Transfer of control from engine room to pilot house is by a single lever moved on signal by the engineer from the pilot house.

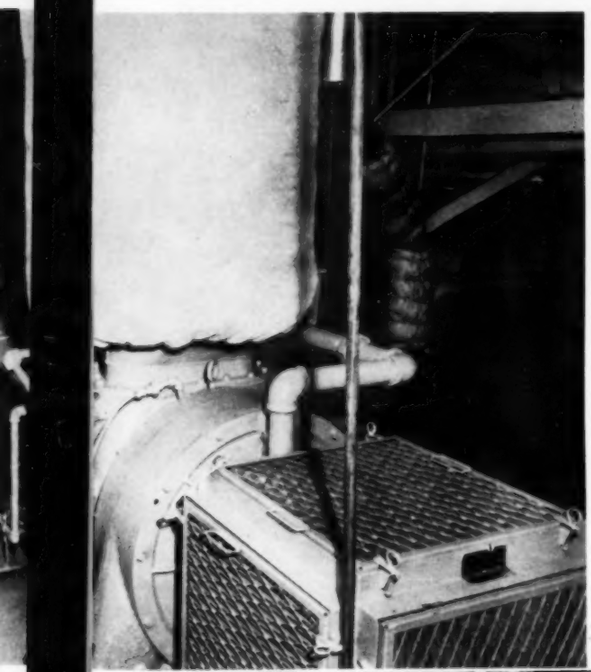
Although the propulsion power and other controls are among the most modern a vessel captain could ask for, the design of the new tanker retains many of the charactertistics of the original *Alaska Standard*. The old boat survived 35 years of working its way in and out of narrow, crooked passages among islands and shoals, all swept by unpredictable weather and strong tides. The new *Alaska Standard* will encounter these same conditions, but with more adequate, modern equipment.

The new *Alaska Standard*, half again as big and fast as her predecessor, is 255 ft. long, with a depth of 21 ft. and a beam of 42 ft. The vessel's 1700 hp is almost three times as great as the 600 hp of the original tanker. Her 13 main tanks have a capacity of 18,380 barrels of petroleum products. The new vessel, operating out of the company's Point Wells terminal near Seattle and those in Ketchikan and Seward, operates in shallow draft areas along the Alaska coast line to service fishing, canning and lumbering installations, as well as domestic demands in the larger port and connecting inland areas. The $2 million vessel, carrying a crew of 27, will attain a sea speed of 13 knots.

All service pumps for both the main engine and gear are electric motor driven. Two Caterpillar model D375 turbocharged 8 cylinder, V-type diesel engines are direct connected to 225 kw, 240/480 volt, 60 cycle, 3 phase, 1200 rpm Electric Machinery Co. generators. An emergency Electric Machinery Co. generator is powered by a naturally aspirated Caterpillar model D311 diesel engine. The generator is 30 kw, 240/480 volt, 60 cycle, 3 phase, 1800 rpm. The vessel's Sperry electro-hydraulic steering system with dual pumps provides both dual follow-up and non-followup rudder control, in addition to automatic steering from the gyro compass. Electronic equipment includes radio direction finder, depth sounder, gyro compass and radar.

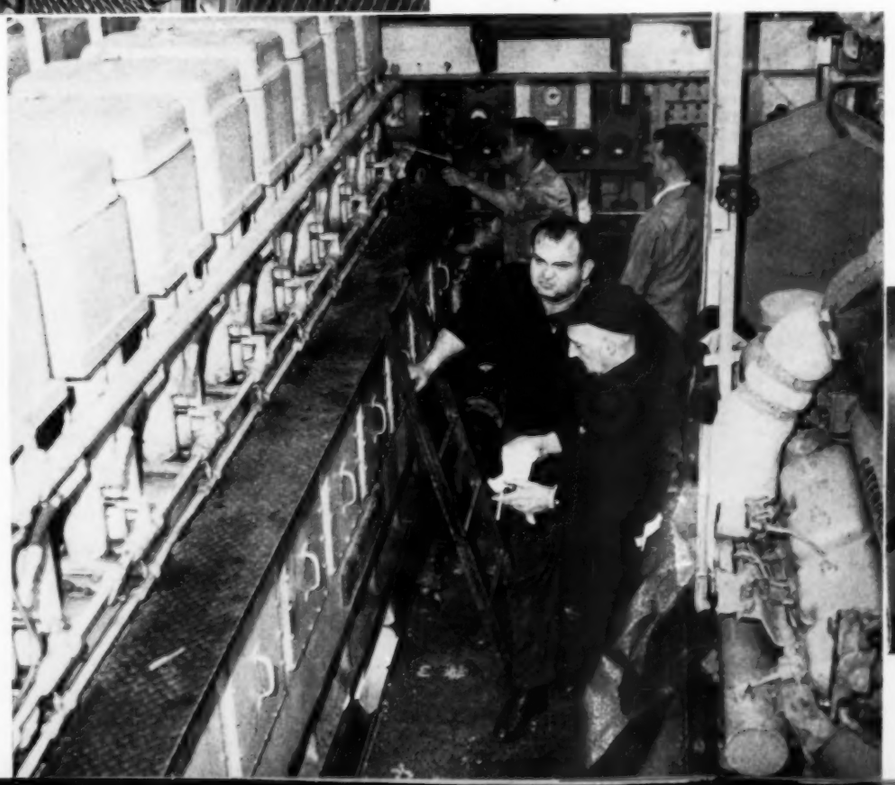
Ready to haul petroleum products to Alaska is the new *Alaska Standard*, a 225 ft. long tanker.

An 8 cylinder, 4 cycle Nordberg Supairthermal diesel engine, 1700 hp at 500 rpm, drives the *Alaska Standard* through a DeLaval-Hindmarch reverse reduction gear. Note Elliott turbocharger, Air-Maze air filter, Kittell muffler and General Electric switchboard.



Principal Equipment Serving 1700 Hp Nordberg Diesel

Turbocharger	Elliott
Auxiliary diesels (3)	Caterpillar
Governor	Woodward
Reverse reduction gear	DeLaval-Hindmarch
Compressors (2)	Quincy
Generators (3)	Electric Machinery
Fuel injection pumps	Scintilla
Fuel oil filter	Nugent
Fuel oil transfer pump	Blackmer
Lube oil filters	Winslow, Air-Maze, Purolator
Cooler	Ross
Centrifuge	DeLaval
Heat exchanger	Ross
Raw water pump	Aurora
Thermostatic controls	Amot, Fulton Sylphon
Air intake filter	Air-Maze
Exhaust muffler	Kittell
Alarms	Brown
Exhaust pyrometer	Alnor
Switchboard	General Electric
Instruments	Weston
Jacket water pump	Aurora



Starboard view of *Alaska Standard's* engine room during builder's trial run shows 1700 hp Nordberg at left and turbocharged Caterpillar-Electric Machinery diesel electric generating set at right. Note Scintilla fuel injection pumps on the Nordberg.

View of *Alaska Standard's* navigation bridge, showing engine room telegraph, engine control stand (Westinghouse Air Brake), radar and steering stand.

TRUCKS REPOWERED WITH SMALL GM DIESEL

2 Cycle 4-53 Engine Put In Units With GVW of 45,000 Lbs. Downward

By J. W. BROWN

Dodge D-600 highway truck, repowered with a GM Diesel 4-53 engine, pulls out of the Anniston (Ala.) General Electric plant for a trip over mountainous country. Gross vehicle weight averages 20,000 to 25,000 lbs.

UNTIL recently the application of diesel engines to trucks struck an economy barrier about two-thirds of the way down the scale of truck weights. This "irreducible minimum" of the size of trucks in which it was generally considered practical in the United States to install diesel engines was about 35,000 lbs. gvw. At 45,000 to 60,000 lbs. gvw or gcw and up, the diesel engine is popular and profitable, particularly on long freight hauls or over mountainous western highways. But in trucks of 35,000 lbs. gvw and less, repeated trials failed to show that diesel economies and diesel performance were sufficiently attractive to offset the additional cost, as compared to mass-produced gasoline engines.

Several factors served to allay enthusiasm for diesels in smaller trucks. Their fuel consumption, while low compared to gasoline, was still not low enough to produce the savings needed to amortize their additional cost. The diesels were too bulky to install without radical changes to frames and/or sheet metal. Any diesels which were small enough to replace gasoline engines failed to produce enough horsepower to do an equivalent job. As for speed, top rpm was too far below those of gasoline engines, this indicating a requirement for different and more costly gearing components.

Among others, the Detroit Diesel Engine Division of General Motors has been fully aware of these factors for some years. The truckers' insistence on better economy led GM Diesel to introducing in 1957 the "E" model of its series 71 engine, designed specifically for larger truck usage. This engine was

Terminal Transport Co., Atlanta, Ga., has converted a White 3000 tilt cab tractor (right) to diesel with a 4-53 engine. Tractor is rated 45,000 lbs. gcw.

Fischer Construction Co., Farmington, Minn., converted this International AC-180 dump truck from gasoline to diesel with a 4-53 engine. The truck is licensed for 39,000 lbs. gvw.

received so well that all of its features, in scaled-down proportions, were included in the new, smaller 2-cycle GM Diesel series 53 engines announced in January 1959. Series 53 engines are built in 2, 3 and 4 cylinder inline models and as a V-6. All have the same bore and stroke: 3⅞ in. x 4½ in. With a permissable top full load speed of 2800 rpm—close to that of gasoline truck engines of comparable horsepower—the 97 hp 3-53 and the 130 hp 4-53 are the particular engines that GM Diesel expects to break through into the small truck industry.

In GM Diesel's new engine production schedule, the first of these available was the 4-53. It established performance data through the repowering by GM Diesel distributors of trucks in a wide variety of usages. The compactness of the 4-53—it is 38¾ in. long, 25 9/16 in. wide and 39 31/32 in. high—has enabled the distributors to make the installations in a variety of makes of trucks, generally without frame or hood alterations. No change in controls has been necessary in most cases. The engine is matched closely enough to its gasoline predecessor that it requires no changes in clutch, gears or rear axle. Five such installations are described below. In varying types of trucking service and in different parts of the country, they indicate the practicality of dieselization of trucks from 45,000 lbs. gvw downward.

With a 1957 Dodge D-600 gasoline driven highway truck carrying an average of 10,000 lbs. of electronic cargo over mountainous highways between Anniston, Ala., and Owensboro, Ky., the Anniston plant of General Electric Co. was faced with the problem of insufficient power. The truck, leased to them by an Atlanta (Ga.) firm, several times required the assistance of other trucks to execute steep grades. Engine repair bills mounted and fuel economy declined. A GM Diesel 4-53 engine was chosen to repower the truck. Purchased from Dixie Engine Co., Atlanta, it was ready for operation July 16, 1959. The engine ably pulls the truck up hills. Pulling 20,000 to 25,000 lbs. gross, the 4-53 is averaging 11.5 miles per gallon. GE personnel are pleased with the performance of the new engine.

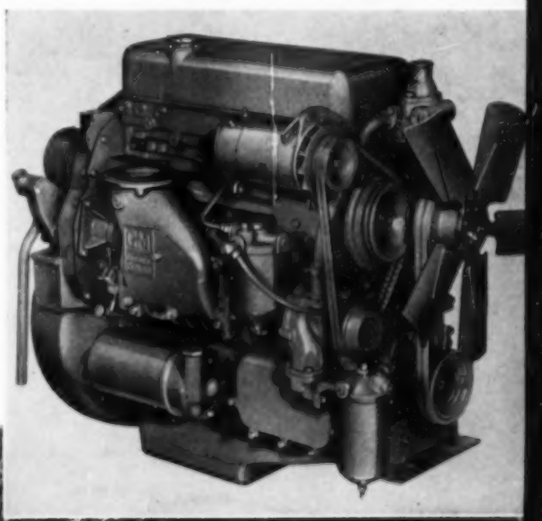
Fischer Construction Co., Farmington (Minn.) gravel contractor, converted its 1957 International AC 180 tandem-axle dump truck to diesel by installing a GM Diesel 4-53 engine in May 1959. The truck is used to haul gravel from pits to construction jobs and to asphalt and concrete plants. It is licensed for 39,000 lbs. gvw. Conversion of the truck to diesel was performed by Interstate GM Diesel of Minneapolis. No major changes of the truck chassis or radiator were necessary. The diesel works through the same torque converter transmission and rear axle that were used with the original 308 cu. in. gasoline engine. Operating controls inside the truck were left unchanged. The dieselized truck, compared to gasoline trucks in the Fischer fleet, reportedly is using less fuel and has more speed on the highways and more power to make grades on the makeshift pit roads.

Although yearly mileage requirements are not high, Mr. S. A. Fitts of Cascade, Va., feels that the new 4-53 installed in his International S-180 truck is providing important savings. As manager of three farms, and as a dealer in agricultural machinery, Fitts uses the long wheelbase flatbed truck for hauling heavy machinery, cattle, farm products and fertilizer. Maximum payload is 15,000 lbs., gross load about 21,500 lbs. About half of the 30,000 miles logged by this truck each year is on the highway; the other half is on farm roads and fields. Fitts sought more power and greater economy than he could get from a gasoline engine. He is pleased with the operation of the 4-53 diesel, which is averaging 13.2 miles per gal. Improved mileage and the lower cost of diesel fuel have reduced Fitts' fuel bill by 50 per cent. This installation was made by King-McIver, Inc., GM Diesel distributor in Greensboro, N.C.

Terminal Transport Co., Inc., Atlanta, has recorded millions of miles on its fleet of heavy-duty highway trucks powered by GM Diesel 6-71E and 6V-71 engines. The advent of the smaller "Jimmy" diesels gives Terminal the opportunity to continue dieselizing and standardizing by turning to the 4-53 engine for some of its gasoline-powered medium-duty rigs. First to be converted was a White 3000 tilt-cab tractor. Mr. Ben White, maintenance superintendent of Terminal Transport's Atlanta shop, will be watching this one with interest, as will other truckers in the vicinity. Dixie Engines, Inc., Atlanta, made this installation.

In Jacksonville, Fla., the Foley Lumber Co. recently had the GM Diesel Florida branch install a 4-53 engine in a Reo F-50 tractor, which is used to haul flatbed trailer loads of finished lumber from sawmills to the Foley yards.

Sufficient time has not elapsed in any of these installations to allow firm reports of fuel economies. Time is required for the expected diesel maintenance savings to appear. Customer reaction, however, is favorable. The GM Diesel series 53 engines may provide at least one solution to the problem of dieselizing the medium-weight and smaller types of trucks.



GM Diesel 4-53 truck engine, with a top full load speed of 2800 rpm.

A 4-53 engine was installed in this International S-180 flatbed truck by S. A. Fitts, Cascade, Va., to replace the original gasoline engine. Maximum payload is 15,000 lbs.

HIGH PRESSURE SUPERCHARGING AND VALVE OVERLAP CONTROL

This Article by Mr. Miller, a Pioneer in the Development and Application of High Pressure Supercharging, Details Results of Recent Work on his System of Valve Overlap Control and Its Effect on Engine Performance

By RALPH H. MILLER*

FOR higher supercharging pressures in the range of 15 to 50 lbs. gauge such as now used in the Miller and the MAN systems, the constant pressure full admission exhaust system consisting of a single exhaust duct of large volume into which all cylinders exhaust has these characteristics:

1. The exhaust pressure blow-down in the cylinder is rapid and drops below the air manifold pressure about 100 crank deg. after the opening of the exhaust valve. This permits early opening of the inlet valve thereby increasing the valve overlap and scavenging duration.
2. The pumping loss in the exhaust stroke is low, which provides for a high relative mechanical efficiency for the constant pressure system.
3. The full admission steady flow turbine used in the constant pressure system has a high efficiency and operates with low pre-turbine pressure and high differential pressure.

These operating characteristics result in good efficiency and load capacity at high level supercharging pressures. In the low load range where the exhaust manifold pressure exceeds the supercharging pressure during the valve overlap period, exhaust gases tend to set up a reverse flow of gas into the intake manifold with the effect of reducing the fresh air charge in the cylinder. My solution to this problem is a reduction in the scavenging overlap in the low load range where the differential pressure is negative but maintaining full overlap in the high load range.

Line 2 in Fig. 1 shows valve overlap versus load for a full load timing in accordance with Fig. 2 with an inlet valve timing variation of 62 crank deg. from full to no load. The exhaust valve timing in this case is fixed. In the light load range (Fig. 3) the inlet valve opens at 13 deg. BTDC and the valve overlap is reduced from 145 deg. at full load to 83 deg. below about 60 per cent load. This overlap is still too long to prevent some back flow of exhaust gas in the low load range. Line 3 in Fig. 1 shows valve overlap versus load with exhaust valve timing control. Overlap is 40 deg. in the light load range; there is no return flow of exhaust gas into the cylinder with this overlap.

A typical valve operating mechanism is shown in Fig. 4. In this design there is no reduction in valve lift as the rollers are retarded or advanced from the mid position. (There is actually a slight increase in valve lift as the roller moves away from mid position.) Since the roller contact arc, at the bottom of the cross head, has its center at the center of the camshaft in the base circle position the cold engine valve tappet clearance is constant in all roller positions over the 31 deg. arc. Tappet clearance changes normally due to variations in engine temperature at different loads can be corrected and held constant at all loads by displacing the center of the cross head arc from the camshaft center. The exhaust and inlet cam roller rocker arms are mounted on eccentrics on a common eccentric shaft. The timing of exhaust and inlet valve and the valve overlap is plotted against an eccentric shaft rotation of 180 deg. in Fig. 5.

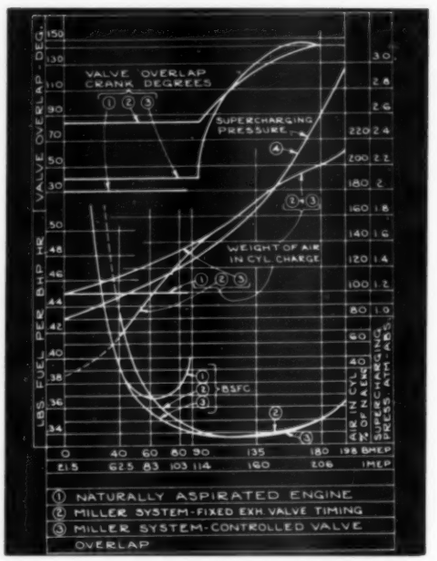

VALVE OVERLAP CRANK DEGREES
SUPERCHARGING PRESSURE
WEIGHT OF AIR IN CYL. CHARGE
BSFC
LBS. FUEL PER BHP. HR.
VALVE OVERLAP - DEG.
AIR IN CYL. LBS. PER MIN.
SUPERCHARGING PRESS. ATM. ABS.
0 40 60 80 90 135 180 198 BMEP
215 625 83 103 114 160 206 IMEP
① NATURALLY ASPIRATED ENGINE
② MILLER SYSTEM-FIXED EXH. VALVE TIMING
③ MILLER SYSTEM-CONTROLLED VALVE OVERLAP

Figure 1

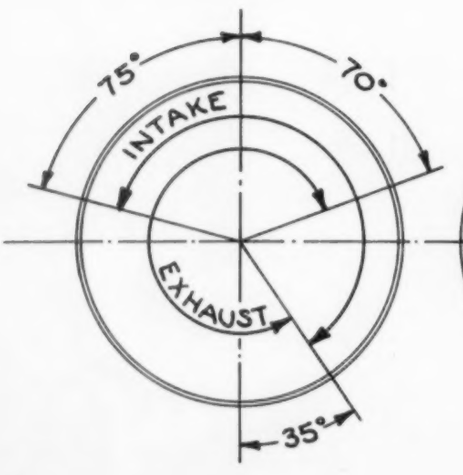
Operating Characteristics

By phasing the exhaust and inlet rocker arm eccentrics at an angle less than 180 deg. as previously used the full load valve overlap increases with decrease in load and so maintains scavenging with decreasing differential pressure. At about 80 per cent load the scavenging overlap is equal to the full load overlap. The maintenance of full overlap in this load range tends to increase thermal efficiency in the upper load range. (Line 3 Fig. 1). Valve overlap and valve timing is plotted against engine load in Fig. 6. In Fig. 7, line 1 shows the ISFC versus pounds of air per hour per IHP in the cylinder charge. The curve has been plotted from best data of a naturally aspirated engine from the hourly air and fuel consumption at various indicated HP. Line 2 in Fig. 7 shows the ISFC versus pounds of air and has been plotted from the supercharged engine data, lines 2 and 3 in Fig. 1. The loss of cylinder air charge by excessive overlap is shown in Fig. 1, line 2 which has been calculated and plotted from the fuel consumption line 2 and the combustion efficiency line 2 in Fig. 7.

At a load of 40 bmep the weight of air in the cylinder charge is only about 68 per cent of the

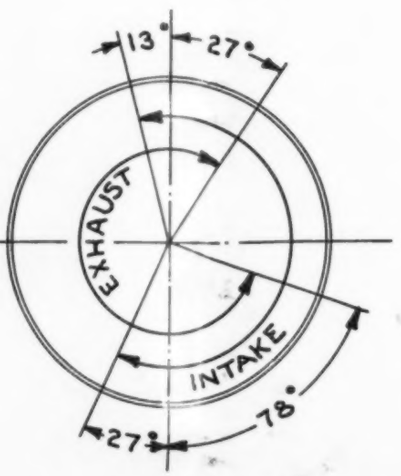
*Consulting Engineer

Figure 2



FULL LOAD

Figure 3



NO LOAD TO APPROX. 60%

naturally aspirated engine charge. The engine operates at this load with only 9.5 lbs. of air per hour per IHP. The naturally aspirated and the supercharged engine operates with 14 and 16 lbs. of air respectively at this load. The latter engine operates without scavenging at this load but with a manifold pressure of 2.7 PSIG intercooled to 100° F. (Line 4 Fig. 1). An engine operating with 9.5 lbs. air/hr./IHP has very little capacity to accept a load acceleration. Power can be increased until the air is reduced to about 8 lbs./hr./IHP or in this case 18 per cent. This requires an increase in fuel of 36 per cent (see line 2, Fig. 7). Below 8 lbs./air/hr./IHP exhaust smoke density increases at a rapid rate and a point is soon reached where addition of fuel does not increase power. When the engine operates with 40 deg. overlap in the low load range (line 3 in Fig. 1) the cylinder charge follows line 3. At 40 bmep the cylinder charge is 115 per cent of the naturally aspirated engine and the engine operates at this load with 16 lbs./air/IHP. With this cylinder charge the IMEP can be doubled to operate at 8 lbs./air/IHP. The bmep then is increased from 40 to 100 psi. The fuel quantity for this load increases about 160 per cent.

The air flow lines in Fig. 1 show air entrapped in

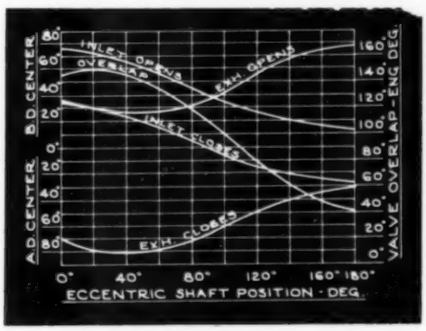


Figure 5

the cylinder only. That is, air available for combustion. The naturally aspirated engine having a volumetric efficiency of .865 operates with 8.5 lbs./air/hr./IHP at 80 bmep with intake manifold conditions of 14.7 psia. and 90° F. (Volumetric efficiency is the ratio of the density of the cylinder charge in the volume of the cylinder displacement to the density in the intake manifold.) The ISFC, line 1 Fig. 7, is .293 and the BSFC is .377. The supercharged engine at full load of 180 bmep operates with a cylinder charge which is 200 per cent of the naturally aspirated cylinder charge (lines 2 and 3, Fig. 1). The manifold pressure is 2.6 atms. at 100° F. and the clearance volume is scavenged 100 per cent. Since the IMEP is also 200 per cent of the naturally aspirated engine the lbs./air/hr./IHP is 8.5 at full load. The ISFC, line 2 Fig. 7, is .306 and and the BSFC .35 lbs./hp/hr.

While the cylinder charge in the naturally aspirated engine can be determined by measuring the air flow into the intake manifold or from exhaust gas analyses, the first method when used in the scavenged supercharged engine gives total flow only but no measurement of the cylinder charge. However, with good instruments a reasonably accurate measurement of the cylinder charge can be made by taking timed gas samples in the exhaust

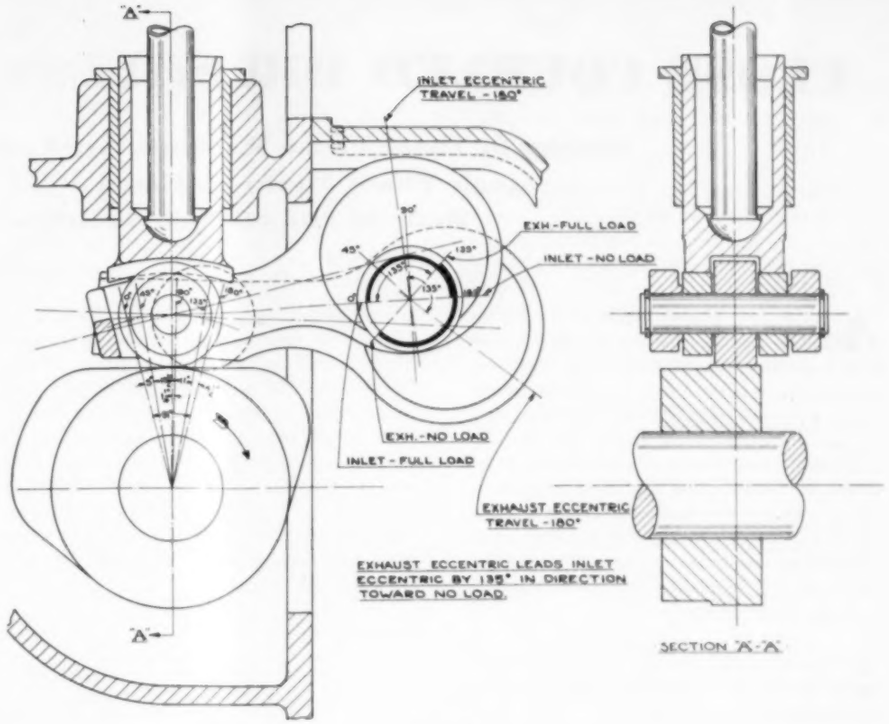
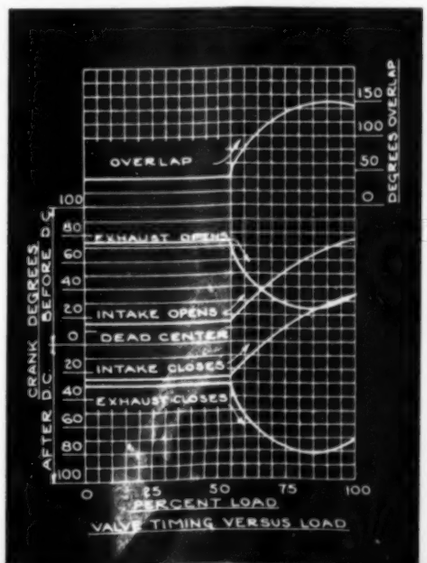

INLET ECCENTRIC TRAVEL - 180°
EXH - FULL LOAD
INLET - NO LOAD
EXH. - NO LOAD
INLET - FULL LOAD
EXHAUST ECCENTRIC TRAVEL - 180°
EXHAUST ECCENTRIC LEADS INLET ECCENTRIC BY 135° IN DIRECTION TOWARD NO LOAD.
SECTION "A-A"

Figure 4

port in the period of the cycle between exhaust and inlet valve opening. Complete scavenging of the clearance volume requires a minimum volume of air at intake manifold conditions of about 2.5 times the clearance volume. On this basis the scavenging flow at 180 bmep is 3.1 and the total flow 11.6 lbs. air/hr./IHP or about 3 cfm per bhp.

With controlled valve overlap the Miller supercharged engine, line 3 Fig. 1, operates with the valve timing of a naturally aspirated engine. When the supercharging pressure reaches 1.5 atms. absolute at about 52 per cent load the compression pressure has increased to 700 psia. From 95 to 180 bmep the valve timing changes automatically thru the action of a servo motor at a rate which maintains the compression pressure at approximately 700 psia over this load range. (Fig. 6). From 95 to about 150 bmep the cylinder air charge, lines 2 and 3, is increased first owing to scavenging rising from zero to 100 per cent secondly owing to progressively decreasing compression temperature.

Figure 6



Scavenging increases the cylinder charge in the ratio of $\frac{r}{r-1}$ (r = compression ratio).

From 150 bmep load to 180 bmep in which range clearance volume scavenging is complete the cylinder charge increases inversely as the compression temperature or, in terms of supercharging pressure, directly with the highest absolute pressure during the intake stroke (supercharging pressure minus pressure loss through intake value) to the exponent .28. If the compression pressure and

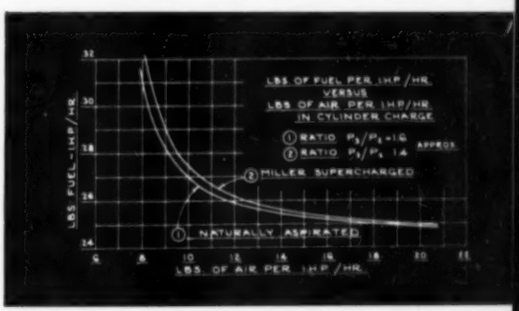

LBS OF FUEL PER IHP/HR VERSUS LBS OF AIR PER IHP/HR IN CYLINDER CHARGE
① RATIO P_2/P_1 = 1.6
② RATIO P_2/P_1 1.4 APPROX.
② MILLER SUPERCHARGED
① NATURALLY ASPIRATED
LBS FUEL - IHP/HR.
LBS. OF AIR PER IHP/HR.

Figure 7

the highest pressure in the cylinder during the suction stroke is known the lbs. of air per hour per IHP can be calculated as follows:

$$IMEP = \frac{37150 \times P_2^{.72} \times P_1^{.28}}{(r-1) \times (Tmf + Tch) \times W}$$

Where:

P_2 = Compression pressure PSIA

P_1 = Highest pressure in intake stroke PSIA

r = Compression ratio

Tmf = Temperature air in manifold deg. F. absolute

Tch = Cylinder heating (20°F. for medium speed)

W = Lbs. of air per hour per IHP

CLOSE COUPLED BRUSHLESS GENERATORS

Ratings of Three Phase Machines Are From 5-400 KW; Single Phase Machines Rated 5-150 KW in Both 50 and 60 Cycle Frequencies

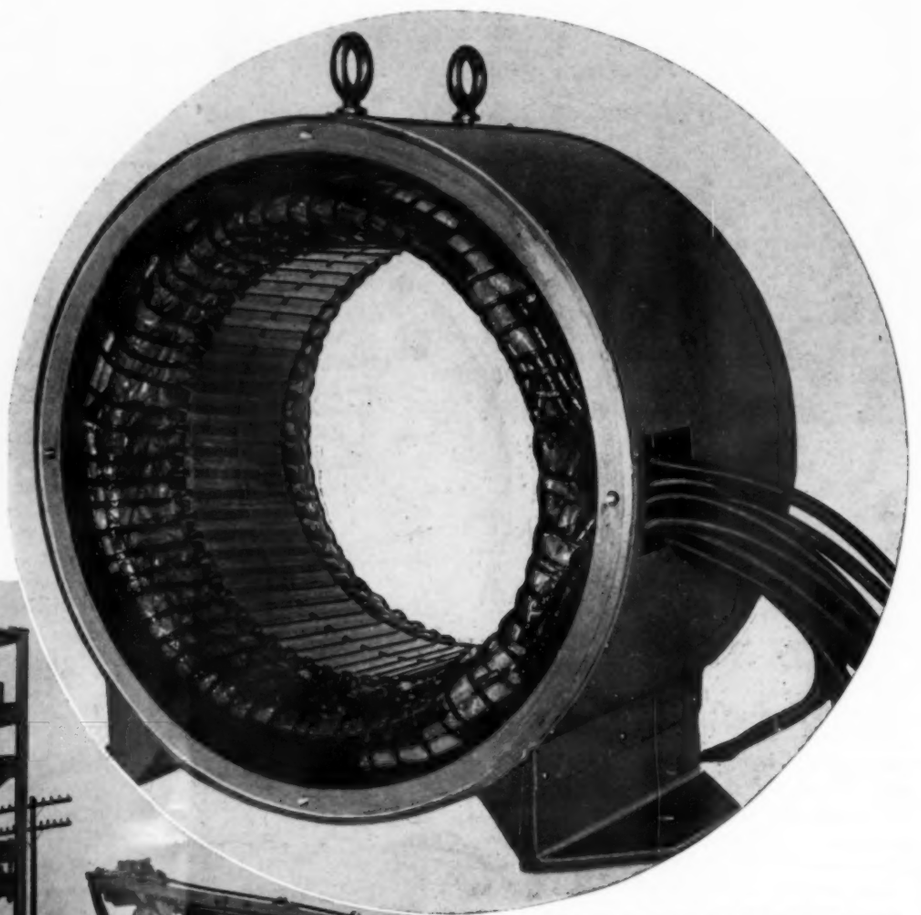
A COMPLETE line of standard brushless revolving field ac generators is available from Kato Engineering Co., Mankato, Minn. These machines are manufactured in both single bearing or two bearing, close-coupled design for direct connection to any commercial engine with standard SAE bell housing. They also are available in two bearing design for belted and direct coupled use with a prime mover. Ratings of three phase machines extend from 5 through 400 kw; single phase machines are rated from 5 through 150 kw in both 50 and 60 cycle frequencies. Also available are 400 cycle and other frequencies.

Kato has conducted research on brushless generators since their development in World War II. It has supplied brushless models for special applications and thoroughly tested several models at inland and offshore oil well drilling locations and on other types of installations. High grade transformer steel laminations, magnet wire and slot insulations are used throughout the Kato brushless generator line.

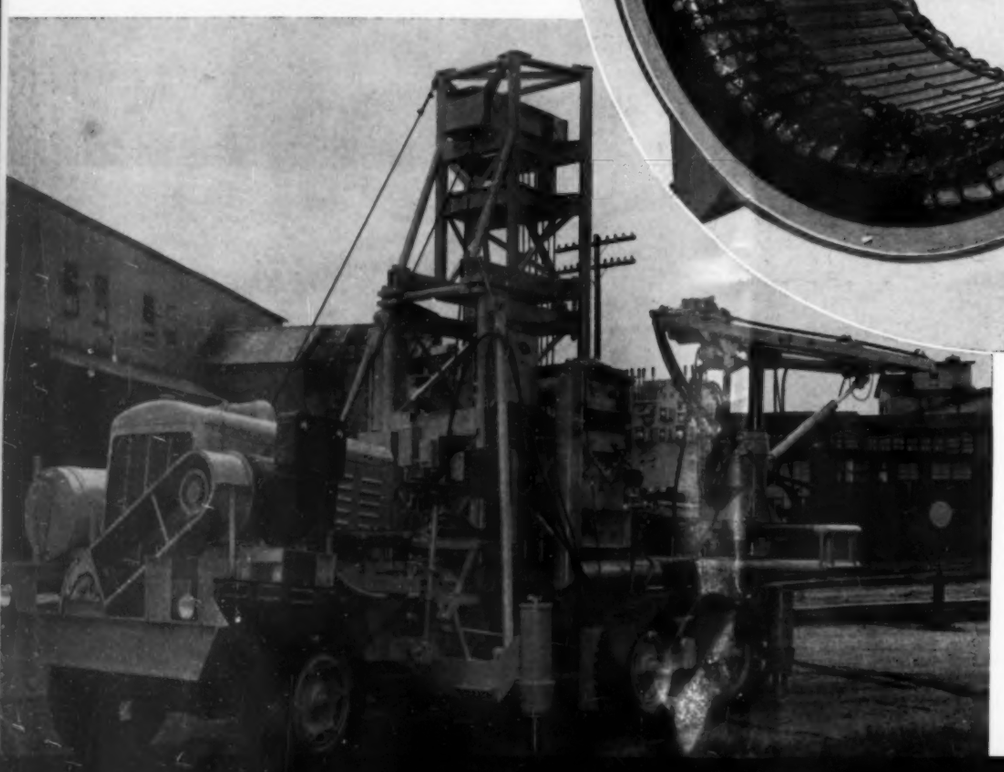
Brushes, commutator and slip rings are completely eliminated in brushless generators, which are especially desirable for installations where sparks may cause an explosion and where dust, excessive humidity and temperature changes would normally cause sluggish brush movement in the brush holders. These generators supply their best power when used with proper voltage regulation and other equipment, according to the company. Kato can supply both static and electro-mechanical voltage regulators. Self-regulated generators also are available in some sizes.

Three phase brushless alternators can be supplied in a wide voltage range. Standard three phase hookup is single voltage, four wire, either star or delta in all standard voltages up to 600. A complete line of three phase 2400/4160 volt alternators also is manufactured by Kato. When specified, 12 lead wires can be provided. Also available at additional cost are 10 wire dual voltage wye; six wire for both single voltage wye and single voltage delta; 12 wire for both dual voltage wye and dual voltage delta (total four voltages). Heavy lead cables of adequate length and current carrying capacity are brought out of the generator mounted outlet boxes. Single phase revolving field alternators are provided with four heavy lead wires brought out from the generator stator into a large outlet box mounted on the alternator frame, permitting the entire output of the generator to be one of two different voltages or the load to be split between two voltages as required. Kato can provide commercial voltages with single phase brushless alternators.

All three phase stators are balanced wound and

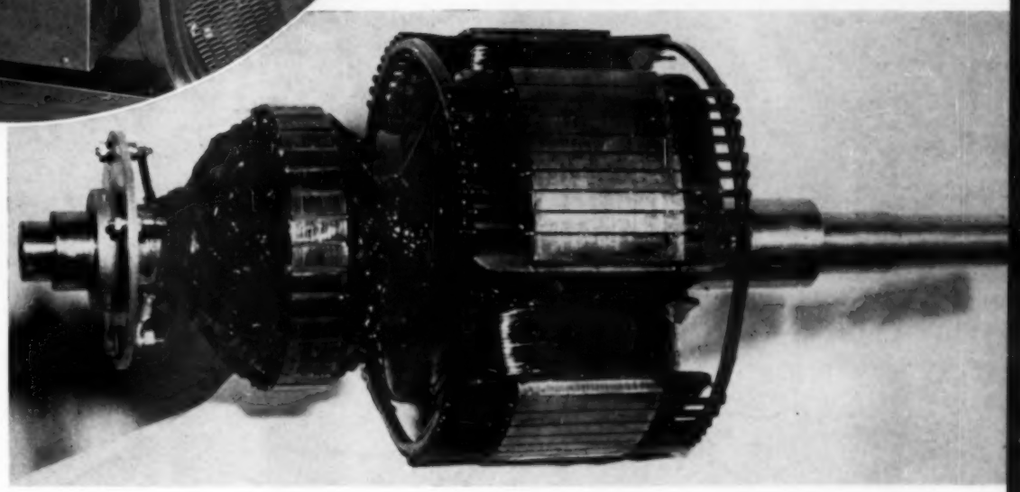


Three phase stator of Kato brushless generator with 12 lead wires permits multiple voltage selection. All Kato three phase stators are balanced wound and balanced hooked up.



Connected to a Cummins diesel engine, this 30 kw, 3 phase, 550 volt brushless generator is mounted on a drilling machine. The machine, for drilling in salt mines, was manufactured by Rogers Iron Works Co., Joplin, Mo.

A Kato 35 kw, 0.8 p.f., 120/208, 3 phase, 60 cycle brushless ac generator with rotary direct connected sleeve type exciter. The alternator is of the two bearing type for direct coupled or belted use with a diesel engine. A small electro-mechanical type voltage regulator, manual regulator adjust, exciter field adjust, ac ammeter and voltmeter with vm-am phase selector switch and a frequency meter are contained in the top panel.



A rotor for Kato brushless generator. Commutator and collector rings have been replaced with silicon rectifier assembly.

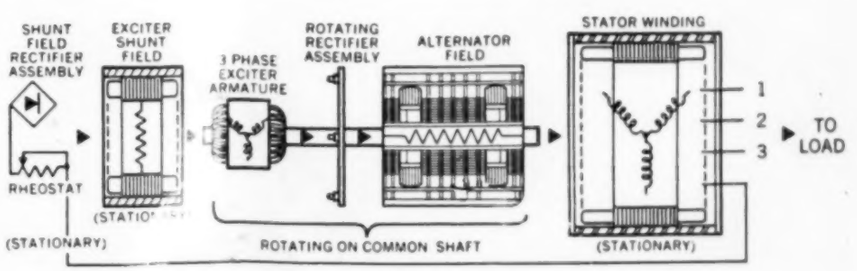
balanced hooked up. Each half phase is equally spaced around the diameter of the stator. This construction, Kato claims, minimizes circulating currents and compensates for the effect of uneven magnetic pull caused by an overloaded phase. Stator lamination slots are heavily insulated with selected slot insulation such as combinations of varnished cambric and Dural paper and some combinations of Mylar and high quality Dural paper as each prewound coil of heavy formvar magnet wire is properly fitted in the slots. All three phase stators are insulated between phases with high grade varnished cambric and Dural combinations. Each slot is sealed with a maple wood, fiber or plastic slot stick. The complete stator assembly is then preheated and immersed in thermosetting baking varnish of high bonding qualities and dielectric strength and baked in gas ovens. Once thoroughly impregnated and baked, they are flash dipped and baked several times.

A three phase Y-connected exciter replaces the conventional exciter with its dc commutator in the brushless generator. The brushless alternator exciter consists of a revolving armature type ac generator. The 3-phase output of this exciter is fed through a silicon rectifier assembly—three silicon rectifiers are mounted on aluminum plates that rotate with the armature shaft. The dc output of this rotating rectifier assembly is then fed into the revolving alternator field. The stationary exciter field poles are fed from the ac output of the alternator through a stationary rectifier assembly. The aluminum mounting plates serve three functions: 1, support of rectifiers on the rotating member; 2, act as a heat sink; and 3, supply terminals for voltmeter test leads while the generator is operating.

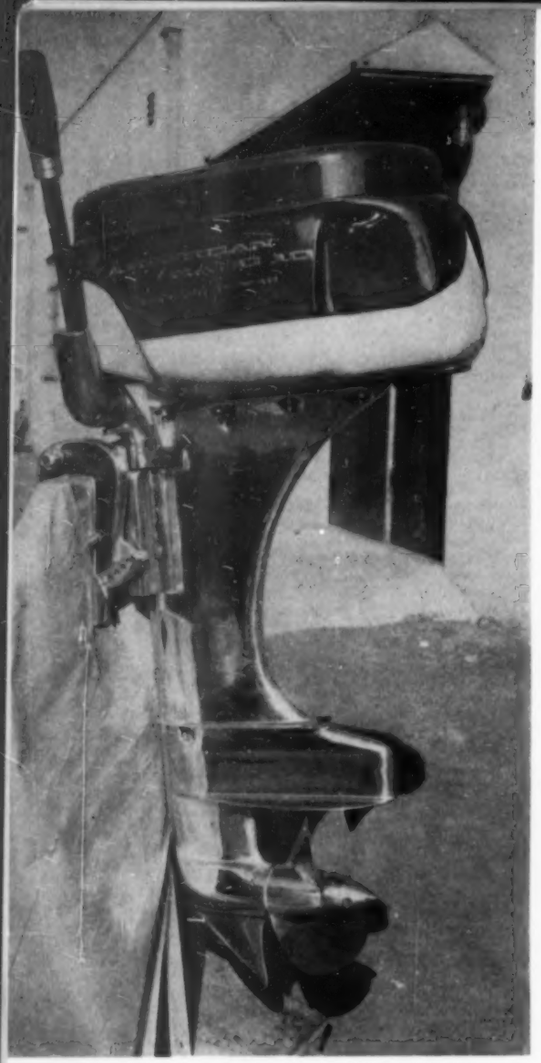
Kato lists these advantages for its line of brushless alternators: explosion resistant; long life span; complete elimination of brushes, commutator and slip rings; increased safety factor; more efficient operation; fewer wearing parts with less maintenance; simplicity of design; maximum voltage selection; excellent electrical performance; improved radio filtration with radio noise practically eliminated; wide range of voltage regulation systems; light weight; and reduction in atmosphere and altitude problems.

Kato says that voltage regulation of small machines up to approximately 150 kw is inherently from 15 to 25 per cent and that inherent regulation of large machines is from 25 to 35 per cent. Response time from no load to full load is from .2 to 1 second with small machines and from .5 second to 5 seconds with large machines when electro-mechanical regulators are used. Maximum voltage dip from no load to full load is from 10 to 25 per cent with small machines and from 20 to 30 per cent for large machines; these same percentages prevail for maximum voltage overshoot.

Maintenance of brushless generators is greatly simplified, Kato says. When the generator is operated properly, the only maintenance normally required is to keep it clean. Bearings are of the pre-lubricated, grease-sealed type.



Descriptive drawing of brushless generator operation.



AMERICAN MARC UNVEILS NEW DIESEL OUTBOARD

California Firm Will Place Single Cylinder 7½ HP Unit in Showrooms in January; 15 and 22 HP Models Will Follow

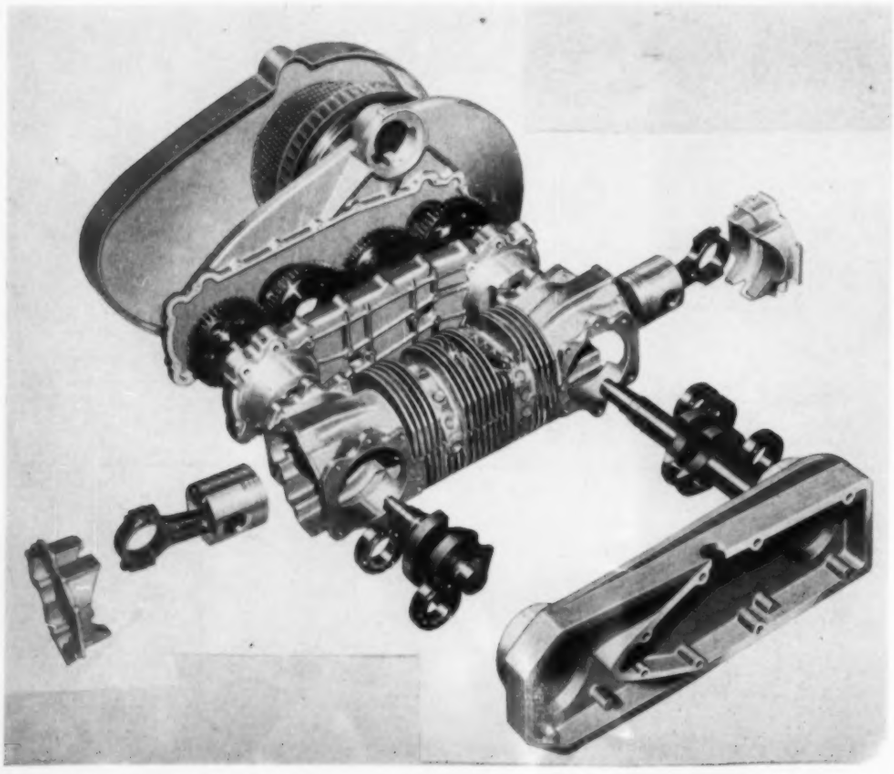
By JAMES JOSEPH

DIESELIZATION of the United States' burgeoning outboard motor market has begun. This country has 5,525,000 outboard owners; potential owners number in the millions. These boating enthusiasts now will have a choice between diesel and gasoline power. Giving them the choice is American Marc Inc., Inglewood, Calif., which is taking the plunge into the market with a new line of diesel engine outboards.

Now in production is the American Marc-10. This air-cooled, single cylinder, 2 cycle, opposed piston engine has a bore of 2½-in., a stroke of 1⅞-in., an 18.5 cu. in. displacement and a rating of 7½ hp at 3500 rpm. Two higher powered diesel outboards—15 and 22 hp models—are on American Marc's drawing boards.

The Marc-10 is slated for marine showrooms about Jan. 15, 1960 (the engine was press-previewed in early September). Marketing dates for the 15 and 22 hp engines have not been announced, although one company official said that "they're headed toward production." American Marc is hoping that its new diesels will take a profitable share of the $250 million annual outboard engine market (until now the exclusive domain of gasoline and electric power). To hedge its hope, American Marc is, in effect, "packaging" its engines in 10 sleek-

This is the Marc-10, the 7½ hp outboard diesel which American Marc will place in its dealer showrooms early in 1960.



An exploded diagram of the Marc-10, which is rated 7½ hp at 3500 rpm. The single cylinder, opposed piston engine is air cooled. Piston displacement is 18.5 cu. in.; compression ratio, 23 to 1.

hulled pleasure craft, ranging from the 14-ft. fiberglass "Baroda" to luxury cruisers.

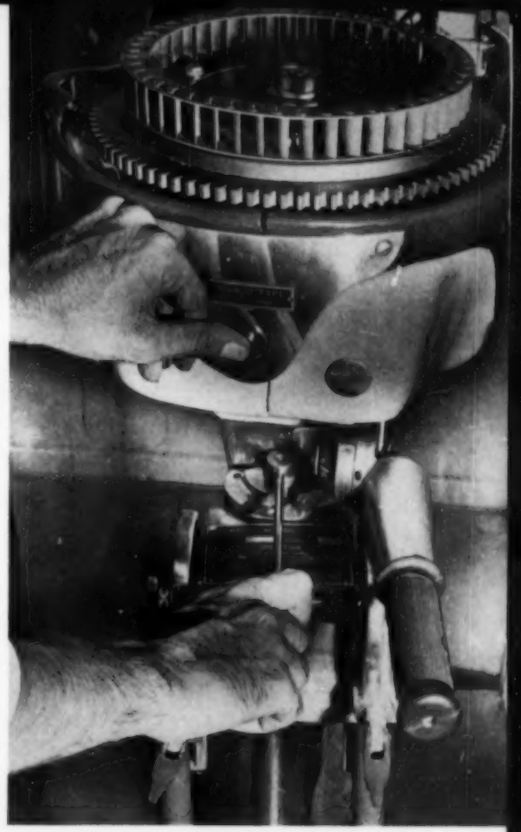
Three of American Marc's 10 boats are sized to fit its first diesel outboard. They are the "Baroda", the 17 ft. "Granada" (also fiberglass-hulled) and the 16 ft. twin-hulled "Catamarine", designed to carry two Marc-10's. Although retail price of the Marc 10 has not been set, it likely will cost between $200-$400. A "Baroda" with the Marc 10 would cost about $1200.

Outwardly, the Marc-10 looks like the traditional outboard with pushbutton starting (an auxiliary 12-volt dc battery energizes an automotive-type starter, which spins the crankshaft). Speed control is incorporated in a twist-grip throttle that is part of the steering handle (the twist-grip regulates the injector pump). A three-position gearshift puts the prop (typical: a 2 or 3 bladed 9 in. prop with a 7-8 in. pitch) in neutral, reverse or forward through gearing in the outboard's trunk section. The engine exhausts underwater through a vent just above the prop.

The sleek Marc-10 is color-toned to fit the boat it is designed to power. Beneath the cowling, however, is a diesel which, in concept, was born out of national necessity—a Department of Defense contract which called for design of a small diesel electric-set, husky and light enough to be strapped to a paratrooper's back. American Marc developed three opposed-piston, diesel engines: a 1½ hp unit driving a 500 watt generator; a 3½ hp. unit powering a 1.5 kw generator and a 7 hp engine driving a 2.5 kw generator. The resulting "package" weighed only 80 lbs. Out of this development grew the Marc-10 and other units now being prepared for production.

Of the outboards (all gasoline and electric) sold in the United States in 1947, 87 per cent were less than 7 hp. Only 2 per cent were over 15 hp. By contrast, only 17 per cent of the outboards sold in 1958 were 7 hp or less; 58 per cent packed 15 hp or more. Simultaneously, engine weight and per horsepower costs have declined proportionately with every rise in horsepower. Costwise, gasoline outboard manufacturers claim a $5 per hp drop in costs over the last decade. Boatmen paid an average of $28.60 per outboard unit of horsepower in 1947. In 1957, they paid $23.60 per hp unit.

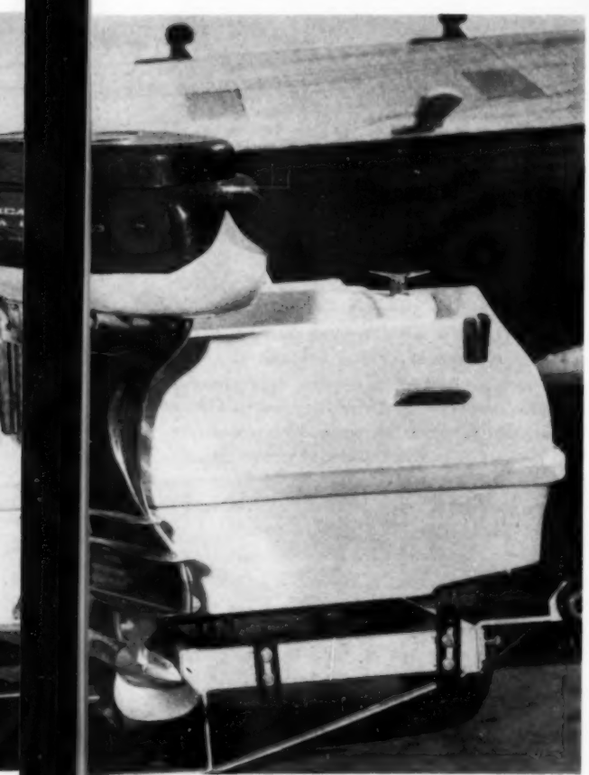
Left behind somewhat in the race for more outboard horsepower was the fisherman. The advent of water skiing underwrote both the boom and the horsepower race. The angler is likely to provide the most profitable market at first for the diesel outboard.



Cowling of the Marc-10 is removed to show the cylinder cooling fan. The engine is pushbutton started, has a 3 position gearshift and a "twist-grip" throttle.

A single injector on the Marc-10 is set in the center of the cylinder.

Similar in appearance to a gasoline engine outboard, the Marc 10 diesel is shown mounted on a boat.



The diesel eventually may be entered in the race for top outboard power. One American Marc engineer said that he saw no reason why 50 hp could not eventually be packaged in a diesel outboard weighing about 250 lbs. At the moment, though, American Marc is hoping to score with small units.

American Marc's chief engineer, Mr. Glen H. Holzhausen, said: "Roughly, the Marc-10 consumes about half a gallon of lowcost diesel fuel an hour. A gasoline outboard of comparable power burns about twice that much fuel . . . and at far higher fuel cost." Another engineer said: "We're out to build the simplest, most dependable outboard on the market . . . and with the diesel we can."

The Marc-10 has a compression ratio 23:1. Its single cylinder is finned and air cooled by an axial fan (some test models use radial fans). Cooling requires from 30-35 cfm of air per horsepower. Aluminum fin surfaces run about 350-400°F., while combustion chamber temperatures reach to 3500°F. at rated 3500 rpm. Of the engine's two crankshafts, one—the "stubby"—transfers its power through a four-gear train to the main drive crankshaft, which powers the propeller and also its associated pumping equipment.

Scavenging follows American Marc's "Vendaco" system. "Third ports" admit air into the crankcase when the pistons are at the top of their stroke. As pistons move away from the top center position, the third ports are closed. Air trapped in the crankcase is compressed. As pistons continue to move towards bottom center, exhaust ports are opened and exhaust blowdown occurs. Immediately after, the transfer ports are opened by the pistons and air which has been compressed in the crankcase is inducted into the cylinder through the transfer ports. This air completes the process of expelling the burnt gases and leaves a charge of fresh air for the following compression stroke. Because transfer ports are at each end of the cylinder, the scavenging process is accomplished from both ends of the cylinder approximately at the same time.

One diesel engineer believes that the diesel outboard should double or triple the hours between major overhauls required for the gasoline-engined outboard. The diesel outboard enters a rapidly expanding market. Within the next 15 years, boat industry spokesmen predict, about 75 million Americans (compared to 37 million today) will own, rent or steer a boat.

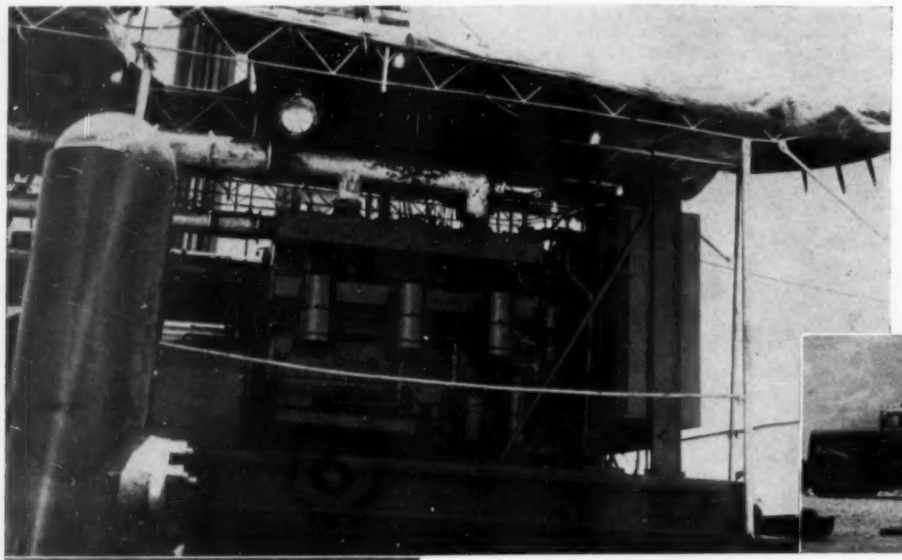
FLORIDA'S QUEST FOR OIL

All But 12 of 300 Wells Drilled in State Since 1943 Are Abandoned, But Veteran Wildcatter Is Sure Black Gold Is "Down There"; Three White Superior Engines Power Rig in Everglades

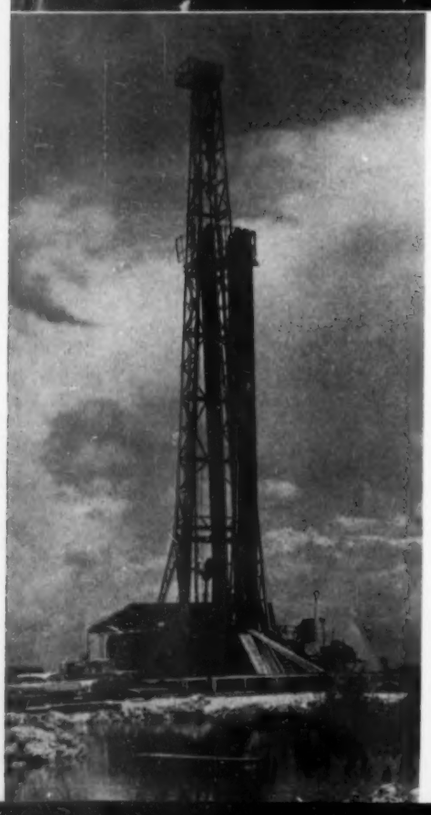
By ED DENNIS

THE search for oil in Florida continues. "It's down there somewhere," says J. L. McCord, a leading Florida wildcatter, speaking of Florida's prospects for becoming an oil producer. "It's just a question of hitting the right rock formation that is porous enough to let it come out." Recent developments and geological explorations in Florida by major oil companies indicate that oil does lie somewhere deep down in the porous rock. Historical data reveals that Florida's earliest drilling for oil took place about 1900 and that exploration has continued sporadically since.

Since 1943, when the state started keeping records, 300 or more wells have been drilled in Florida. All except about a dozen have been abandoned. The only two producing areas discovered to date are the Sunniland field on the lower west coast and the two wells at Forty Mile Bend on the Tamiami Trail. These latter two have been capped.



Both these International trucks serving the 80-B rig have Cummins diesel engines. The truck at the right is used to take electric logs. An oil well cementing truck is at the left.



Three naturally aspirated PTD-6 White Superior engines power the Ideal 80-B rig drilling near Forty Mile Bend, Fla. Note Purolator lube oil strainers, Michiana filters, Bode industrial type filters and Vortox air filters.

An overall view of the Ideal 80-B rig on location near Forty Mile Bend, north of the Tamiami Trail.

Drilling for Florida's latest wildcat oil venture got off to a good start a few months back at Commonwealth Oil Company's newest drill site, two miles north of Tamiami Trail at Forty Mile Bend. Deep in the Everglades this new site is only a few miles north of the two successful wells completed in 1954. Gulf Coast Drilling & Exploration Inc., of Laurel, Miss., has the contract for the drilling.

Power for the Ideal type 80-B drill is provided by three model PTD-6, naturally aspirated White Superior diesel engines. These specially designed engines have a piston displacement per stroke of 3575 cu. in. Each has a continuous bhp of 364 at 900 rpm. The engines have a regular Superior variable speed centrifugal type governor specifically designed for oil field work. Each is provided with a Purolator duplex lubricating oil strainer and one Michiana oil filter, plus a Bode industrial lube oil filter and three Vortox air filters. The engines are radiator cooled. No mufflers are used. Two Westinghouse air compressors supply the air. One compressor is driven off a power take-off on the No. 1 Superior engine; power for the other compressor is provided by an electric motor.

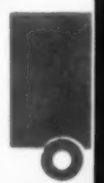
Over on Cay Sal, off the Florida coast, Howard Hugh's offshore drill rig reached a depth of 18,000 feet before the project was abandoned. This drilling platform was similar to the one previously described in DIESEL PROGRESS (June 1956, *The Scorpion.*) GM Diesel engines provided propulsion for the personnel craft and other marine equipment on this location.

Two major oil companies, Gulf Oil and the California Co., are paying the government a whopping $1,711,872 for drilling rights in the tidelands off Key West. The areas involved, totaling 132,480 acres, lie between Marquesas Key and Dry Tortugas. Out in the Gulf of Mexico, approximately 40 miles northwest of Key West, a Kerr-McGee drilling rig rises 220 ft. in the air. Four sets of twin GM Diesel 4-71 engines with GM power take-offs pull the Gardner-Denver air compressors on this drilling platform.

The Florida Keys have a history of oil indications. Crude oil was spotted floating during the construction of the overseas highway in 1937. Aerial survey photographs taken several years ago showed unaccounted-for oil slicks on the blue water south and west of Key West. A few years ago, the Brewster-Bartle Drilling Co. of Houston drilled a well about 22 miles west of Marathon in Florida Bay. GM diesel engines propelled this equipment.

Now you can have DIESEL ECONOMY in light and medium-weight vehicles at low initial cost

HERCULES NEW DIESEL LINE is the first to make diesel re-powering of lighter vehicles both practical and economical



NEW HERCULES DIESELS FOR ever priced within

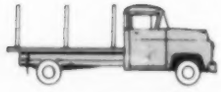
CABS

PICK-UPS

MULTI-STOPS

3,000-6,000 GVW

LIGHT VANS

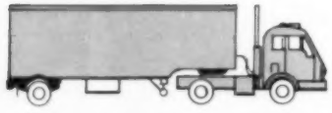


LIGHT STAKES

ROUTE VANS

6,000-12,000 GVW

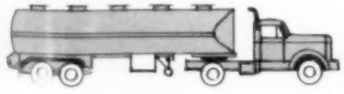
MEDIUM VANS



LIGHT TRACTOR-TRAILERS

12,000-24,000 GVW (to 36,000 GCW)

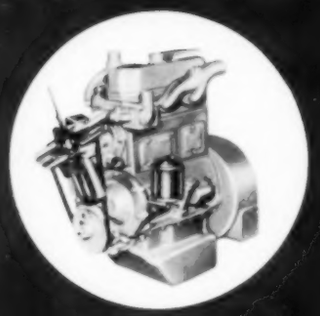
TRACTOR-TRAILERS

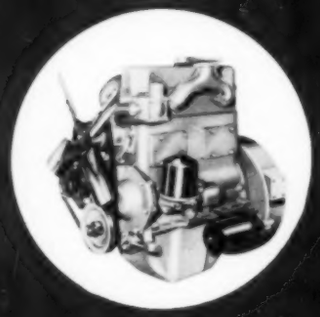


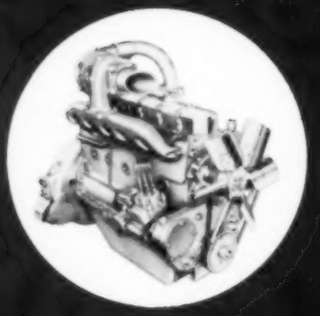
TANKERS

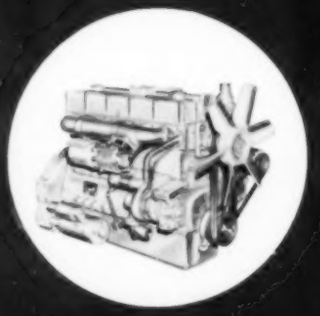
22,000-38,000 GVW (to 55,000 GCW)

REPOWERING are the first reach of every operator!









MOST WEARING PARTS ARE INTERCHANGEABLE BETWEEN ALL ENGINES

HERCULES ECONOMICAL THREES

DD-149-H DD-169-H

- Compact, balanced design packs 60 max. hp in 550 lb package
- Full, 2,800 rpm automotive design and construction
- First economical 4-cycle diesel truck engine ever offered in its size
- Terrific 3-cylinder fuel economy for in-town service

HERCULES FUEL-MISER FOURS

DD-198-H DD-226-H

- 75 and 80 max. hp engines designed to match your vehicle's needs
- Outperforms many 6-cylinder diesels
- Compact . . . lower weight/brake hp than other comparable diesel engines
- Ideal for shuttle work . . . low fuel consumption with economical 4-cycle power

HERCULES POWER-PACKED SIXES

D-298-H D-298-HT

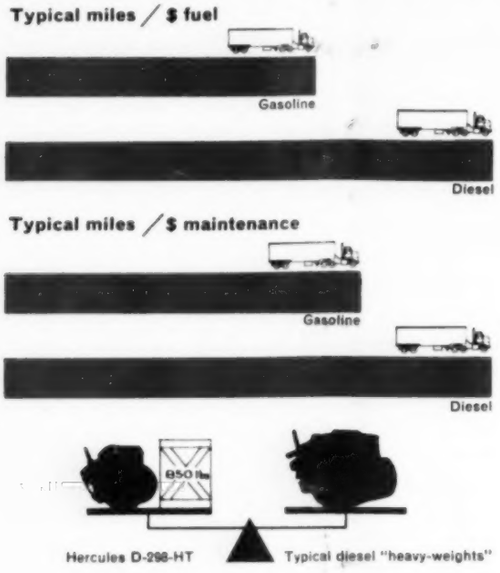
- 115 (naturally aspirated) and 175 (turbo-charged) max. hp at 3,000 rpm
- Lowest weight/hp of any diesels in their class—turbo-charged model weighs no more than many comparable gasoline engines
- 4-cycle fuel economy and simplicity
- Compact high-speed design permits repowering most gasoline engine-driven vehicles without changes in gear trains

D-426-H D-426-HT

- 150 and 180 max. hp from these quiet-running power plants
- Low weight/hp ratios—only 6.8 lb/BHP in the turbo-charged model
- Compact size makes repowering simple and easy
- 4-cycle economy saves on fuel costs, maintenance

and look at these low representative "fan-to-flywheel" list prices: 3 cylinder DD-169-H, $950; 6 cylinder D-298-H, $1400

Here's how you can earn more by REPOWERING WITH HERCULES DIESELS



FUEL ECONOMY

Everyone knows the one, big money-saving advantage of diesels: more ton-miles per dollar of fuel. And now Hercules makes these diesel savings available to operators of light and medium-weight trucks through its new line of light-weight, low-cost diesels. No need to pay for engine weight or horsepower you don't need: you can match a Hercules diesel to your vehicle for just the power and speed you want. And Hercules 4-cycle design really gives fuel economy, at idle or full throttle.

MAINTENANCE ECONOMY

Fleet records have confirmed that diesels normally operate up to 4 times longer than gas engines between major overhauls: require less tune-up, too, since there's less to go out of adjustment. So don't spend more money on costly gasoline engine maintenance when you can now buy economical diesels at a price you can afford. And Hercules diesel line offers complete interchangeability of high mortality parts between 3, 4, and 6-cylinder engines.

HIGHER PAYLOAD

These new Hercules diesels give big dividends in weight savings over large, over-the-road diesel engines. Each engine has been designed especially for its job and for the weight ranges of vehicles shown. As shown in our diagram, the result means as much as 850 pounds *less* engine dead-weight, 850 pounds *more* carrying capacity with Hercules diesels over other diesels offered for the same job. This means greater earning power for your trucks powered with Hercules diesels.

AND THERE'S MORE DIESEL NEWS IN THE MAKING AT HERCULES

The engines shown here are only part of the results of a 5-year development program which Hercules has conducted. Hercules research and development engineers have directed their efforts toward providing the trucking industry with diesel engines designed for—not applied to—today's requirements.

For example, here are some of the developmental engines on which exhaustive tests are now being completed: engines which will set new standards of performance and economy as vehicle power plants:

- *an aluminum V-8 truck diesel*, which will be more compact, more economical and lighter than any comparable engine available today
- *a line of "Polydiesel" engines*, to operate on diesel, gasoline, jet fuel, even kerosene *interchangeably*.

A NOTE TO TRUCK MANUFACTURERS:

You'll find that Hercules has a unique approach to diesel engines for OEM sales. It will pay you to investigate this further with your Hercules representative or by writing Hercules Motors Corp. at its Canton, Ohio headquarters.

SERVICE EVERYWHERE

Hercules has a growing, aggressive distributor organization anxious to serve you, wherever you are.

HERCULES MOTORS CORPORATION
Canton, Ohio

I'm interested in more specific information on how I can repower with new Hercules diesels:

Make & Model Truck _____ Year _____

Type of Service (check) ☐ in-city ☐ interurban ☐ interstate

Name _____

Title _____

Firm _____

Address _____

City _____ Zone _____ State _____

HERCULES

HERCULES MOTORS CORPORATION
Canton, Ohio

WATCH HERCULES FOR THE "NEW LOOK" IN ENGINES

Well more than 1000 hp in GM diesel engines is concentrated here to load a twin-engine 24 cu. yd. Euclid TSS-24 scraper. The scraper, with a 6-110 engine in front and a 6-71 in the rear, is push loaded by two twin-engine (6-71's) 24 cu. yd. Euclid TC-12 crawler tractors.

DIESELS HUM AS NAVAJO DAM RISES IN CANYON

More Than 80 Units of Productive Equipment in Use on $43 Million Job

By L. H. HOUCK

Working on the spillway section, an Allis-Chalmers HD-21 tractor bulldozes material. A fleet of 14 diesel HD-21's is on the Navajo Dam job. All have Twin Disc torque converters, Donaldson air cleaners and AC fuel oil filters.

Chet Dapron, Morrison-Knudsen veteran, is Navajo Dam equipment superintendent for the joint venture firm, Morrison-Kaiser-F. & S.

NAVAJO Dam, a $43 million project of the United States Bureau of Reclamation, is rising fast in a winding, deep-cut canyon of the San Juan River. The location is an arid northwestern corner of New Mexico, 39 miles east of Farmington and 80 miles east of Four Corners, where the boundary lines of Colorado, New Mexico, Arizona and Utah meet. The nearest railroad is at Aztec, N.M., 32 miles away by existing highways. Here in Navajo country diesels are superseding *taebidahi*, the Navajo winged Shiprock symbol of of power. Ageless Angel's Peak looks down at modern smoke signals spouting from the exhaust stacks of hundreds of diesels. The result will be water, green vegetation and recreational facilities for one of America's last frontiers.

Prime contract for construction of Navajo Dam

Some of Navajo Dam's 29 million cubic yards of excavation is handled by this 4 cu. yd. Bucyrus-Erie 88-B shovel, shown loading a Euclid bottom dump. The 88-B has a Cummins V-12 diesel engine with Donaldson air cleaners and AC fuel filters.

Harold D. Gard is project manager for Morrison-Kaiser-F. & S.

was awarded in June 1958 to a joint venture group composed of Morrison-Knudsen Co., Henry J. Kaiser Co. and F. & S. Contracting Co. for $22,822,624. Construction involves tremendous quantities. The dam will rise 388 ft. above the San Juan River bed to become the second largest earth-fill dam ever built by the Bureau of Reclamation. The largest will be Trinity Dam, now under construction in California. The embankment will contain 26,250,000 cu. yds. of fill, mostly borrow. Its 3800 ft. long crest spans a sun-baked canyon. More than 29,200,000 cu. yds. of excavation will be required.

Here in one of the most arid parts of the country, Navajo Dam will create a 1,709,000 acre-ft. reservoir, 6085 ft. above sea level. When filled, the reservoir will have a surface area of 15,650 acres extending 34 miles up San Juan River into southern Colorado. It will become one of the largest bodies of water in New Mexico. Navajo Dam—Reservoir is one of the principal storage units of the Colorado River Storage Project and, if legislation pending before Congress is authorized, will furnish irrigation water for some 110,000 acres of Navajo Indian land. It would be a boon of the first magnitude for the Navajo Indians. The resulting revenues would rank second only to the royalties now flowing to the once starving tribes from oil and uranium discoveries.

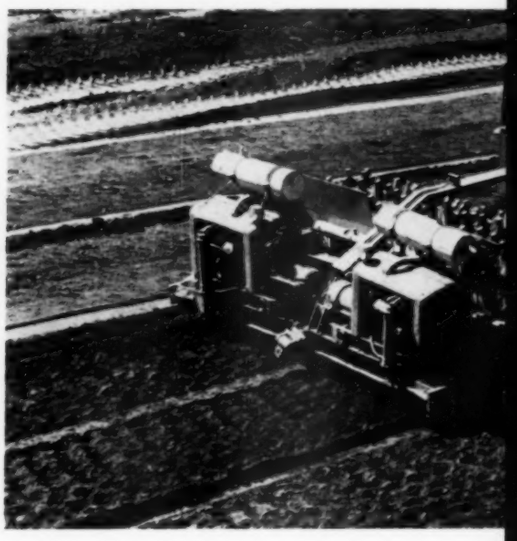
The contractor has 4 years 8 months, or 1700 calendar days, to complete the job. The project is beset with problems as a matter of course, but work is progressing on a "high ball" basis backed with ample machinery and experienced construction workers. To name a few problems, the dam embankment is being constructed with three zones of selected materials. Some of these materials are pervious and others must be impervious. Finding impervious materials in quantity is not an easy matter in this dry country. Some of the materials will be hauled from borrow pits as far as four miles away.

Proper soil for building this dam is of primary importance. The earth borrow pits for Navajo Dam must be watered around the clock for 20 days. This is a job for a portable sprinkling system, built on the order of a giant irrigation system. Each lift of fill is sprinkled down with water from three diesel (Cummins) sprinkling trucks equipped with 5000 gal. tanks. The purpose of the watering of the earth borrow pits is to obtain proper water content for optimum compaction in the embankment. Other problems include high altitude, abrasive materials, steep slopes approaching 1:1 and big volumes of material to be moved.

In addition to the embankment, a chute-type spillway, 1410 ft. long, 138 ft. wide at the crest and 195 ft. wide at the stilling basin, is being blasted out of rock. Blast holes are drilled by five Gardner-Denver Air-Trac drills, supplied with air from three Gardner-Denver 900 cfm air compressors using 6-110 GM Diesel engines. Blasted rock is moved by turbocharged Allis-Chalmers HD-21 bulldozers, working in twosomes side by side. Rock and boulders are pushed over the canyon's edge. The spillway will consist of an approach channel, concrete crest structure, spillway bridge, chute, stilling basin, outlet channel and access house for drainage gallery.

The outlet works will consist of a concrete tower intake structure 280 ft. high with diversion inlet and an 18 ft. 9 in. diameter circular outlet tunnel 1650 ft. long. Higher up on the canyon wall, 43 ft. above the main tunnel, an auxiliary outlet works tunnel, 7 ft. in diameter, is being driven. With the completion of these tunnels, a cofferdam will be constructed to divert the flow of the river through the main diversion tunnel.

More than a 1½ million cu. yd. of material was excavated for the embankment foundation. The impervious core zone will include selected clay, silt, sand and gravel which will be compacted with

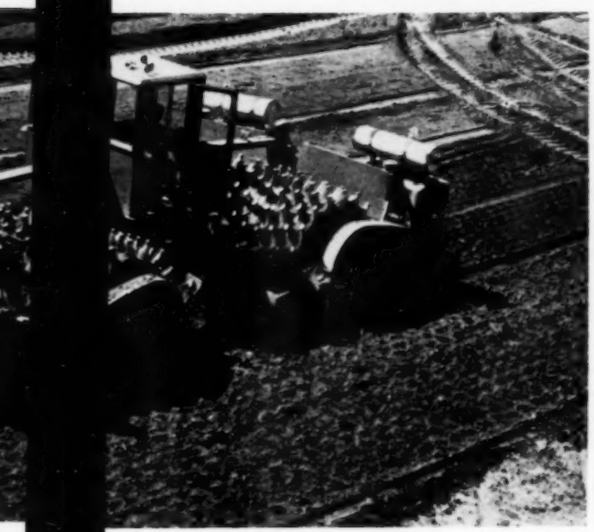


tamping rollers in 6 in. lifts. This will amount to about 9,500,000 cu. yd. compacted. The pervious mixture will include sand, gravel, cobbles and boulders to be compacted by crawler tractors in 18 in. lifts. This will amount to 11,250,000 cu. yds. compacted. Production men and equipment work two 9-hr. shifts daily; shop and maintenance crews work three 8-hr. shifts daily.

A 30 cu. yd. Euclid bottom dump is loaded by a Euclid belt loader. The belt is driven by a GM diesel 6-71 engine. The loader is pushed and pulled by HD-21 tractors.

Almost 80 units of diesel driven productive equipment, some carrying two and up to four engines, and 38 units of non-productive diesel equipment, such as big and small supply trucks, are on the job. This fleet is properly maintained while it works 18 hours a day by 6 mechanical foremen, 6 welders, 43 mechanics, 3 steam cleaners and 14 men in lube and fueling work. Dump trucks stop at a field station located between loading site and dump area, for lube checks and refueling. They are ready to go in about seven minutes. The lube department takes its equipment to the shovels and other relatively stationary base equipment. Both wet and dry air cleaners on all equipment are serviced each 24 hrs. under normal conditions; when bad dusty conditions prevail, the checks are made twice each 24 hrs. Crankcase oil is drained and filters changed at 100 hrs.

Each of the four sheepsfoot rollers on this Ferguson compactor working at Navajo Dam is driven by a GM diesel 4-71 engine through an Allison torque converter.



The equipment used to load the blasted rock and to dig gravel is impressive and efficient. Heading the excavator fleet is a 20-year-old Bucyrus-Erie 450-W walking dragline, which was moved here from a stint on the St. Lawrence Seaway. Swinging a 17 cu. yd. bucket, the dragline was digging in the river when the job was visited by this reporter. It was dumping into an elevated hopper. Diesel driven Euclid dump trucks were loaded under the hopper chute so that the big machine did not have to wait for trucks. The 450-W had a Cooper-Bessemer JS-8 naturally aspirated diesel engine driving main gears direct and a 272 amp General Electric main generator and exciter. Amot thermostats were used in the cooling system.

Shovels included a 4 cu. yd. Bucyrus-Erie 88-B with Cummins V-12 diesel, Donaldson air cleaner and AC fuel oil filter; a 2½ cu. yd. Northwest 80-D with a Murphy diesel; and a 3½ cu. yd. Bucyrus-Erie 71-B with a 6-110 GM diesel. These machines loaded into a fleet of a dozen 30 cu. yd. bottom dump Euclids and 10 Euclid 17 cu. yd. end dumps. All these dumps have 6-110 GM diesel engines. The scraper fleet consisted of 11 twin-engine, 24 cu. yd. Euclids. Each unit has a GM diesel 6-110 engine with AiResearch supercharger in front and a GM diesel 6-71 engine on rear. These scrapers were pushed loaded by crawler tractors operating in tandem.

The crawler fleet included 14 Allis-Chalmers HD-21 tractors with Twin Disc torque converters; one HD-21-G loader; and four Euclid TC-12 twin-engine tractors, each powered with a pair of GM diesel 6-71's. Another big capacity dirt moving machine on this job is a Euclid belt loader with a 275 hp Cummins diesel engine. This unit usually pushed and pulled by an Allis-Chalmers HD-21 tractor in front and back.

Representing the Bureau of Reclamation on the job is W. W. Brenner, project construction engineer, and E. D. Henry, field engineer. H. D. Gard is project manager for Morrison-Kaiser-F. & S.; Chet Dapron is equipment superintendent; Darrell Newton, preventive maintenance supervisor; and Leo Boothe, master mechanic.

Principal Items of Equipment

EXCAVATORS: One 17 cu. yd. Bucyrus-Erie 450-W walking dragline; one 4 cu. yd. Bucyrus-Erie 88-B shovel; one 3½ yd. Bucyrus-Erie 71-B shovel; one 2½ cu. yd. Northwest 80-D shovel; two ¾ yd. Northwest truck cranes. Diesel engines—Cooper-Bessemer, Cummins, GM, Murphy.

TRUCKS: 12 Euclid 37LDT 30 cu. yd. Euclids with GM diesel 6-110 engines; 10 Euclid 65TD 17 cu. yd. end dumps with 6-110 diesels.

SCRAPERS: 11 Euclid 24 cu. yd. TSS-24's with two GM diesel engines each—6-110 in front and 6-71 in rear.

CRAWLER TRACTORS: 14 Allis-Chalmers HD-21's with A-C diesels, Twin Disc torque converters, Donaldson air cleaners, AC oil filters, Bosch injectors; one HD-21-G loader; 4 twin engine Euclid TC-12's with 6-71 diesels, AC accessories and Allison torque converters.

SPRINKLER TRUCKS: 3 equipped with 5000 gal. water tanks, using Cummins diesels.

AIR COMPRESSORS: Three Gardner-Denver 900 cfm capacity with 6-110 GM diesel engines.

GRADERS: Three Allis-Chalmers Model 45's with A-C diesels.

MISCELLANEOUS: Euclid belt loader—275 hp Cummins diesel; 5 light plants—3 with Lister diesels and 2 with Caterpillar diesels; Ferguson compactors with 4 GM diesel 4-71 diesels and Allison torque converters; 38 pieces of non-productive equipment, some with diesel engines.

FUEL OIL: Standard Oil Co.

LUBE OIL: DA Lubricants, Indianapolis.

A Euclid scraper pulls in at a field station for refueling. Note Donaldson twin dry type air cleaners.

Digging out the bank of the San Juan River and loading into a hopper is a Bucyrus-Erie 450-B walking dragline with 17 cu. yd. bucket. The 450-B is driven by a naturally aspirated Cooper-Bessemer JS-8 diesel.

AUTOMATIC OPERATING DIESEL PLANTS

This Is the Second and Concluding Part of Mr. E. R. Sauder's Article on Power Plant Automation

By E. R. SAUDER*

THE unattended or fully automatic station is, of course, the ultimate as far as controls designers are concerned. To call any power station unattended is in the first place a misnomer, and we usually mean by unattended, a station where the operators are confined to a maintenance type of operation—the starting, stopping, synchronizing, etc., being performed automatically. At this point, I will list part of the equipment needed for this type of station.

For each engine-generator unit, the following equipment is needed. This is in addition to automatic station switchgear:

One floor mounted control panel containing the alarm and shutdown relays and visual and audible alarms; the operating relays, gauges and controls for the direct-connected auxiliaries, such as pre-lube pumps, jacket water pumps; and in installations where an electric governor is used, the governor master control unit. Most systems also have scanning type pyrometers for cylinder temperatures. Also located on the front of this panel is a control switch, which may be set for automatic operation or may be set in "manual" in which case the engine is isolated from the central control system and will operate as an individual unit.

One set of "on-engine" controls such as pressure and temperature sensing devices for operation and protection.

The following are common to all engines:
One floor-mounted station control panel in which are located various auxiliary controls common to all engines. Also mounted within this panel is another unit which controls the starting, stopping, loading and unloading of the units according to load demands. Also in this panel is the automatic synchronizing and speed matching equipment.

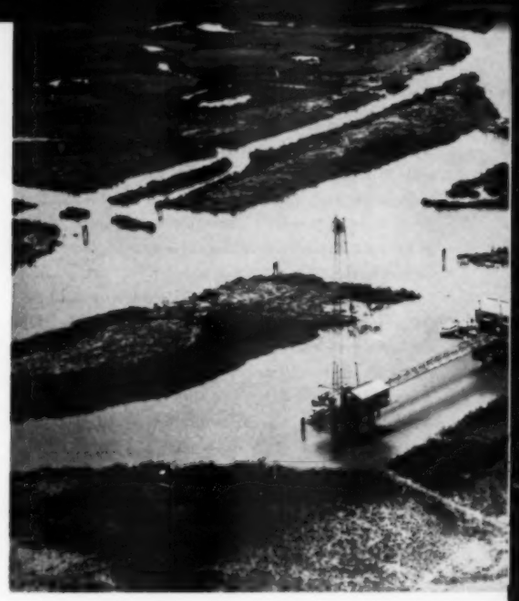
We found that in order to make this station fully automatic, it was necessary to install a load sensing system. This system is designed to accurately read the load and to institute the starting, stopping, and running procedure according to load demands. This system we have called the Sen-s-tron, and it is the heart of the Cooper-Bessemer En-Tronic supervisory control system for multiple generator operation. As an example, consider a typical, four-engine, automatic plant in which we installed a thermoverter in each generator output, which through current and potential transformers accurately measures the power output of each generator. This three phase, ac power measurement is converted into dc millivoltage, and this millivolt output is fed into the Sen-s-tron unit where it is "digested" and comes out as the starting, stopping, loading, and synchronizing information, which in turn is fed to engine control panel.

One of our plants, the Nantucket station with a rated capacity of 3100 kw, illustrates the function of this type of equipment. This plant is located on Nantucket Island about 30 miles off the coast of Massachusetts. The island is approximately 15 miles in length, 57 sq. miles in area, and has a year-round population of some 3500 people. This population takes a drastic jump during the summer vacation months which means that the utility load jumps to three times the usual peak load in approximately a two-week period. Due to the type of load and the economic factors present, the utility company decided on a completely automatic station. At one time (due in large part to a substantial whale oil business), this island had a year-round population of some 8000. However, kerosene put an end to the whale oil business, and then, of course, electric power in turn put an end to the kerosene business. As an added complication to automatic control here, this three-engine station is operating on residual fuel oil. This is a three unit station using No. 2 fuel for starting and the above mentioned No. 6 residual fuel oil for continuous operation. We have two, 1250 kw units, and one 700 kw unit. The start-up procedure is:

Set-up of controls: All three engine control switches will be placed in the automatic position, thereby connecting them to the control unit, which measures load demand. Located on the station control panel is a sequence selector switch, which sets up the preferred order of operation, such as engines 1-2-3 or 3-2-1, etc. Assuming a 1-2-3 sequence, the following occurs. Notice, this is not a push-button type of operation, but the pushbutton has been dispensed with, and control comes altogether from the En-Tronic Sen-s-tron unit. It should also be noted that regardless of load demands, this system keeps one engine on-the-line at all times. With No. 1 engine running and the load measuring unit calling for additional power, the following occurs:

Starting: Upon receiving the starting signal, the En-Tronic control starts the pre-lube pump and positions the other necessary valves and controls preparatory to starting. When this predetermined time expires, thus assuring proper lubrication and

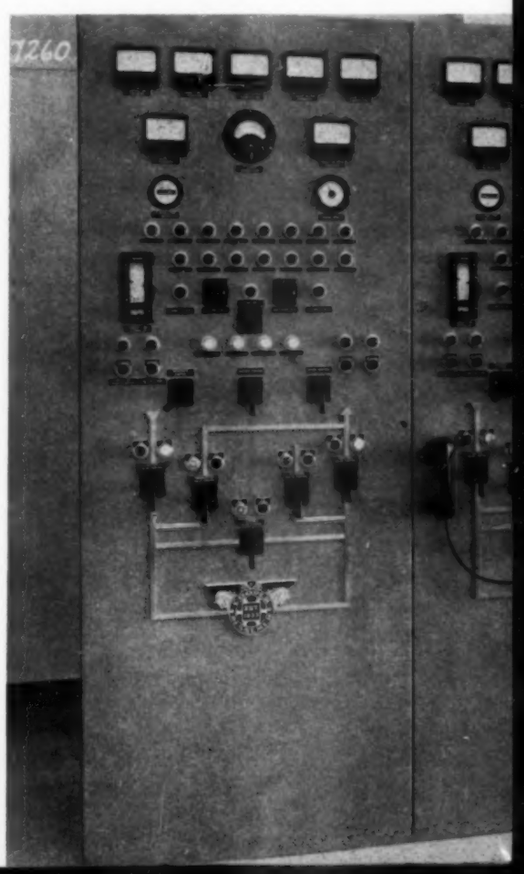
*Controls Specialist, The Cooper-Bessemer Corp.

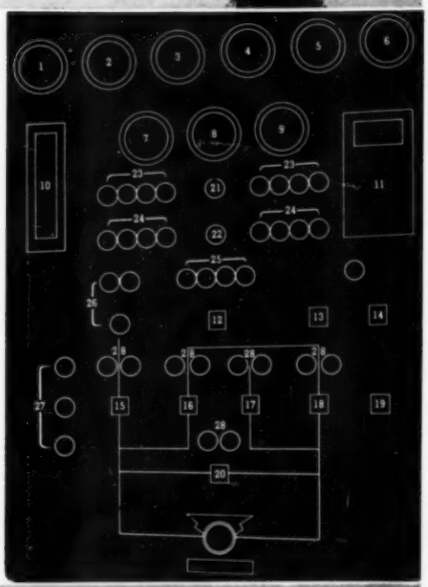


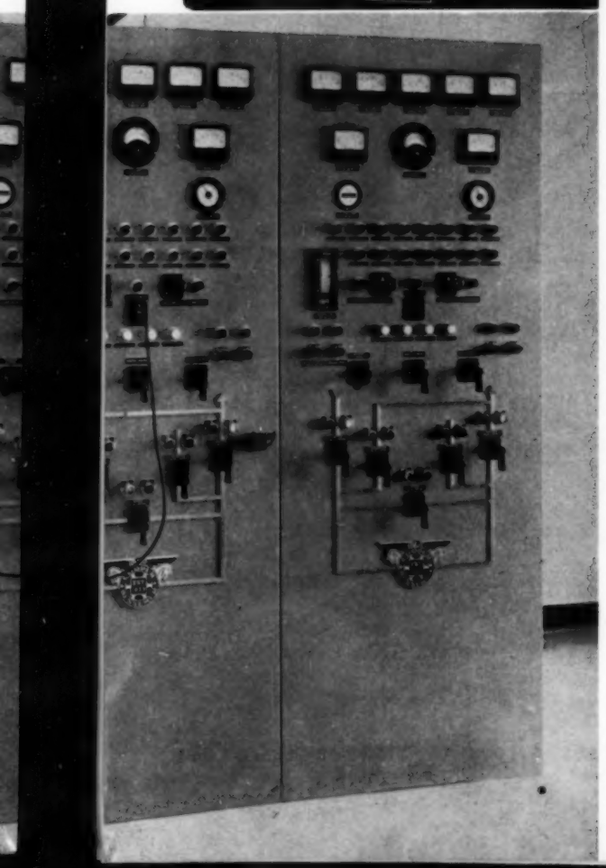
Olga station of Southern Natural Gas Co. which is remotely controlled from a 40 mile distance.

En-Tronic control panel—1. Starting Air Pressure; 2. Jacket Water Pressure; 3. Jacket Water Temperature; 4. Lube Oil Pressure; 5. Lube Oil Temperature; 6. Fuel Gas Pressure; 7. Engine Speed; 8. Hydraulic Oil Pressure; 9. Elapsed Engine Operating Time; 10. Intake Manifold Reading; 11. Pyrometer; 12. Master Control; 13. Alarm Test; 14. Shutdown Test; 15. Section Valve Manual Control; 16. Purge Valve Manual Control; 17. Blowdown Valve Manual Control; 18. Discharge Valve Manual Control; 19. Auto-Manual Selector; 20. By-pass Valve Manual Control; 21. Reset Button; 22. Horn Silence Button; 23. Alarm Indicating Lights; 24. Shutdown Indicating Lights; 25. Sequence Indication (Power On, Starting Air, Ignition, Fuel Gas); 26. Governor Control; 27. Auxiliary Pumps—Manual Control; 28. Valve Position Indicating Lights.

En-Tronic control panels serving Cooper-Bessemer engines in Flory (Tex.) station of Permian Basin Pipe Line Co.







starting conditions, starting air is admitted to the engine cylinders causing the engine to roll. At the same time, No. 2 fuel is injected into the cylinders causing the engine to come up to speed and under control of the governor.

Synchronizing: Upon signal from the Sen-s-tron control, the engine is automatically brought up to synchronous speed, and when synchronized, the generator breaker is closed, putting this second engine on the line.

Loading: With the generator breaker closed, the Sen-s-tron unit of the control proceeds to load the engines according to load demand. This loading system varies with the type of engine governor used; namely, hydraulic, electric, or pneumatic. When the rated output (this is a setting in the Sen-s-tron and may be adjusted) is reached, the next engine is started and is put on the line as described above. Important: This system is designed to automatically bypass an engine that should fail to start or that cannot start because its control switch is in an off position.

Fuel change-over: Through a signal received from the control panel, the No. 2 fuel oil is shut off, and the No. 6 fuel oil is admitted to the engine. This changeover to No. 6 fuel will not occur, unless the No. 6 oil has been preheated to the proper temperature. The preheating of the heavy (no. 6) fuel is done through heat exchangers with the source of heat being from either the low pressure boiler used to heat the power house or from heat removal equipment connected to the engine exhaust system. The latter will, of course, add to the overall plant efficiency. The control panel will automatically switch the engine back to No. 2 fuel, if the heavy (no. 6) fuel pressure or temperature drops below a safe level. This changeover will not interrupt engine operation.

Unloading: When the total load requirement drops and the second engine is no longer needed, the Sen-s-tron unit starts to unload this second engine by transferring the load to the No. 1 engine. When this is accomplished, the generator breaker trips, thus removing this No. 2 engine from the line. The sequencing of No. 3 engine is the same as described for No. 2.

Purging: Through the control system, a purging period is put in the sequence to remove the heavy fuel from the engine and replace with No. 2 fuel to prepare for future start-ups. At the conclusion of purging, the engine is shut down. At the Nantucket installation, we had to change our original design in the purging sequence. The original design called for tripping the breaker before purging the engine of No. 6 fuel. In actual experience, we have found that to do this, the purge period is prolonged excessively. Due to control flexibility it was possible to make changes in the sequence that permits purging the engine of No. 6 fuel while still on the line and under load. The post lubrication or cooling-down period is accomplished by operating the pre-lube pump and the jacket water pump for a pre-designated time after the engine stops. After this time period, these auxiliaries shut down and control resets ready for next start.

Dead buss operation: One of the features of this control system is its ability to start from a dead buss (complete power loss). Due to flexibility of the diesel station at times of light load, there may be need for only one engine generator to be operating. At this time, power loss due to engine or generator failure can prove to be highly undesirable, but with this type of control, this failure has been nearly eliminated. In addition to the visual and audible warning signals, the En-Tronic control will immediately start the standby engine. Upon restoration of station power, the line feeders (which have been automatically opened) will be closed by a sequencing system in the control, which prevents overload on the started engine. The outage, therefore, is *strictly* limited.

Remote alarm: Cooper-Bessemer has designed several types of remote alarm receiving stations, whereby alarms from the central power station are transmitted to a remote point. This can be one of the engineer's homes to the local telephone office location. The basic remote control consists of a portable receiver that upon receiving the trouble signal from the power plant indicates by means of visual and audible alarms that trouble exists. The telephone operator can then place a call to the operators who are on call. We are at present operating several stations by micro-wave. One of these stations is located in the Gulf marsh area of Louisiana on a Texas type tower. This is a 4-engine gas pumping station and is operating unattended from a control center located 40 miles from the engines.

Governors: Nantucket has one other feature of interest. This installation is 100 per cent electric governor controlled. This is the first installation of this manufacturer's governor on engines of this size. Being new, we have had to work out some of the "bugs" in the system; however, these have not been of a serious nature and some of them were of necessity caused by our particular control system design. The paralleling feature alone makes this type of governor highly desirable in the generating plant. As several of the leading manufacturers are now building electric governors, I think that in the future, we shall see their use greatly expanded.

Oil and Gas Transmission

Although I have presented primarily the automatic power plant, automatic engine controls have been used to a much greater extent in the pipe line transmission business. We now have engines that are started, loaded, unloaded, and stopped remotely, both through microwave and telemetering equipment. These stations are completely unattended and all essential information is transmitted to and from a central operation point. This information includes the various fault signals that occur, such as high jacket water temperature, low lube oil pressure, and the malfunction of any of the system valves or auxiliary equipment. From the design experience gained in present installations, it is now possible to extend to pipe line transmission, the "no push button" principle of the power plant Sen-s-tron unit. It will be feasible to operate entire pipe line systems through computer types of equipment which will acknowledge the variables of pressure zone temperature and customer demand.

SERVICE AWARD BASED ON RIGID TESTS

By J. W. BROWN

IN December 1958, after a long period of study and planning, the service department of the Detroit Diesel Engine Division initiated the GM Diesel Service Craftsman Guild. The guild is a world-wide association of GM Diesel mechanics with "bylaws"; strict membership qualifications, which are subject to periodical review; psychological and tangible rewards for those who attain membership; and a goal of accomplishment which pays dividends to customers, to GM Diesel and its distributors and dealers, and to the servicemen.

Aims of the GM Diesel Service Craftsman Guild as outlined by GM Diesel are threefold: 1, to assure the customer of standard high quality service from all GM Diesel service outlets, regardless of their size or location; 2, to improve the position of the mechanic to the respected level of a technician; and 3, to provide distributors and dealers with increased income from sales and service by substantially improving the overall efficiency of the service workmanship.

Membership in the guild is based upon examinations. To qualify, a mechanic must take an examination which covers all of the basic GM Diesel products by category. The 100 questions cover the Series 71 and 110 engines, turbocharging, torque converters, marine gears, diagnosis or "trouble shooting", engine tuneup and customer relations. This "qualifying" examination is given and monitored by a GM Diesel regional service engineer. It is usually given at the distributor or dealer's place of business, although GM Diesel is also planning to make the examination available to mechanics who attend the factory service school while they are there. Both this examination and the required "sustaining" membership examinations which follow at two-month intervals are of the "multiple choice" variety. This means that the mechanic has only to check off the correct answer out of four possible answers to each of the 100 questions. This eliminates the need for the applicant to be a writer as well as a mechanic in order to pass.

The membership tests were not designed to examine mechanical ability, but as a test of product knowledge. It is assumed that the distributors and dealers can find men who are handy with tools, but to find men who know the product and who will keep abreast of product development and the latest product service procedures is yet another matter.

While tangible awards, including valuable prizes, accrue to the GM Diesel mechanic who qualifies as a Service Craftsman, experience is proving that the men actually value the prestige and the self-improvement which the program encourages even more highly. The awards for having qualified are presented with considerable pomp and ceremony at a dinner meeting planned by GM Diesel representatives and the distributor or dealer. The distributor or dealer is given a polished hardwood and bronze placque to display in his office or showroom. The placque carries the names of the qualifying servicemen, who are given a shoulder patch and a gold pin stating that they are qualified service technicians on GM Diesel products.

The continued success of a distributor or dealer is highly dependent upon the quality of service rendered by his servicemen and upon customer relations, which these men influence considerably. Customer relations, including complete understanding of warranty terms, are as much a part of the program as technical ability. Diesel engine mechanics are often asked to work in the field, completely without supervision. GM Diesel distributors are so enthusiastic about the program that some of them have voluntarily added monetary awards to the manufacturer's awards for qualification to the Craftsman Guild.

Any movement that brings more ability to bear on the customer's maintenance and service problems means more sustained production and reduced costs to him. As Mr. Al Schaff of Western Branch Diesel Sales and Service, West Norfolk and Portsmouth, Va., put it at a presentation dinner recently: "The customer does not come to you to purchase 'labor'. He can pick that up on any street corner, and at a price set by the state. He comes to purchase *product knowledge* and the application of this knowledge. By instituting the Service Craftsman Guild GM Diesel is, in effect, writing the customer some satisfaction insurance."

Within the first few months' existence of the Service Craftsman Guild, GM Diesel representatives made membership presentations at most GM Diesel distributor locations. Mr. C. B. Clum, GM Diesel's general service manager says: "This program has been accepted wholeheartedly by our distributors and dealers and by their servicemen. This enthusiasm insures high quality service on GM Diesel products as a result of the service technician's personal interest in keeping current on product improvements and improvements in service procedures," he added.

Mr. Charles Stewart (left), GM Diesel's regional service manager, presents a placque to Mr. J. G. Will of Stewart and Stevenson Services, Inc., Houston, Tex. Others are (from left): Mr. C. B. Clum, GM Diesel general service manager; Mr. Eric Sutton, regional manager; Will; and Mr. Joe Manning, general manager of Stewart and Stevenson Services, Inc., Houston, Texas.

Sample of the Service Craftsman Guild award placque given to GM Diesel distributors whose servicemen have qualified for membership.

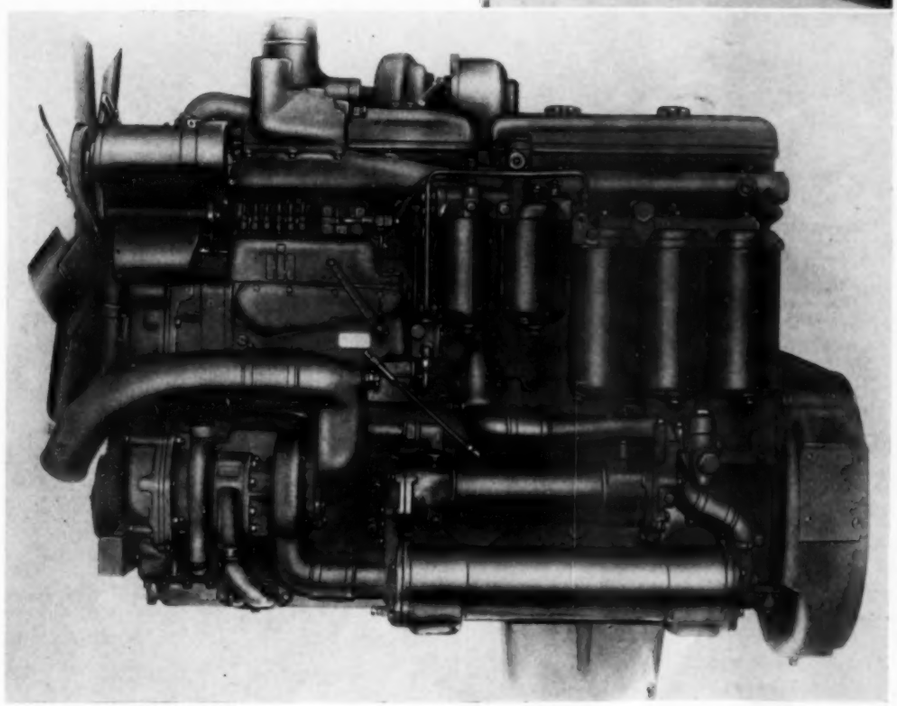
335-375 HP IH TRACTOR BUILT FOR TOLL ROADS

A NEW diesel-driven tractor designed especially for "truck-train" service on toll roads has been announced by International Harvester's motor truck division. Standard engine in the new model DCOF-405 tractor is a 335 hp Cummins NRTO. Available as an optional engine is a new 375 hp International diesel engine—the first IH-built diesel the company has ever offered in its truck line. This engine is the model D-817, a 6-cylinder, 4-cycle unit which DIESEL PROGRESS presented in its February 1959 issue.

"Our decision to build a tractor to meet the requirements of toll road service," said Mr. R. M. Buzard, vice president in charge of IH's motor truck division, "was based on the recent action by the New York Thruway Authority and the Massachusetts Turnpike Authority permitting permanent operation of double-bottom rigs, and the successful performance of our experimental equipment that participated in the extensive tests." Four companies which ran truck trains experimentally on the two toll roads in tests that began last February used International tractors.

New International Harvester DCOF-405 tractor has been designed for truck-train service on toll roads and other heavy-duty, long distance hauling operations. Standard powerplant is a 335 hp Cummins NRTO-335 diesel engine. An 817 cu. in., 375 hp turbocharged International Harvester-built diesel—the model D-817—is optional.

Cab of a DCOF-405 is tilted to show International D-817 engine—the first International built diesel ever offered in the company's motor truck line.



International's D-817, a 6-cylinder, 4-cycle turbocharged diesel, has maximum torque of 1038 lbs./ft. at 1450 rpm.

The DCOF-405 tractor is a 160 in. wheelbase, cab-over-engine, 6-wheel tractor rated at 127,400 lbs. gross combination weight, the maximum allowable under new regulations. Two types of sleeper cabs are available with bumper to back of cab lengths of 72 or 80 in. Either permits use of 40 ft. double trailers within the prescribed 98 ft. overall length limit. Both are hydraulically operated tilt cabs. Buzard said that the International tractor was short enough to pull single 40 ft. trailers on regular New York 50 ft. limit highways after they are split from a train.

The standard 6-cylinder, 4-cycle Cummins NR-TO-335 engine is used with a Fuller R-96 Road-Ranger transmission, 15-in., 2-plate Spicer clutch and Eaton 38-D-S rear axles. Available with the optional International D-817 engine are a Spicer 8125 transmission and the 15-in., 2-plate Spicer clutch and Eaton 38-D-S rear axles.

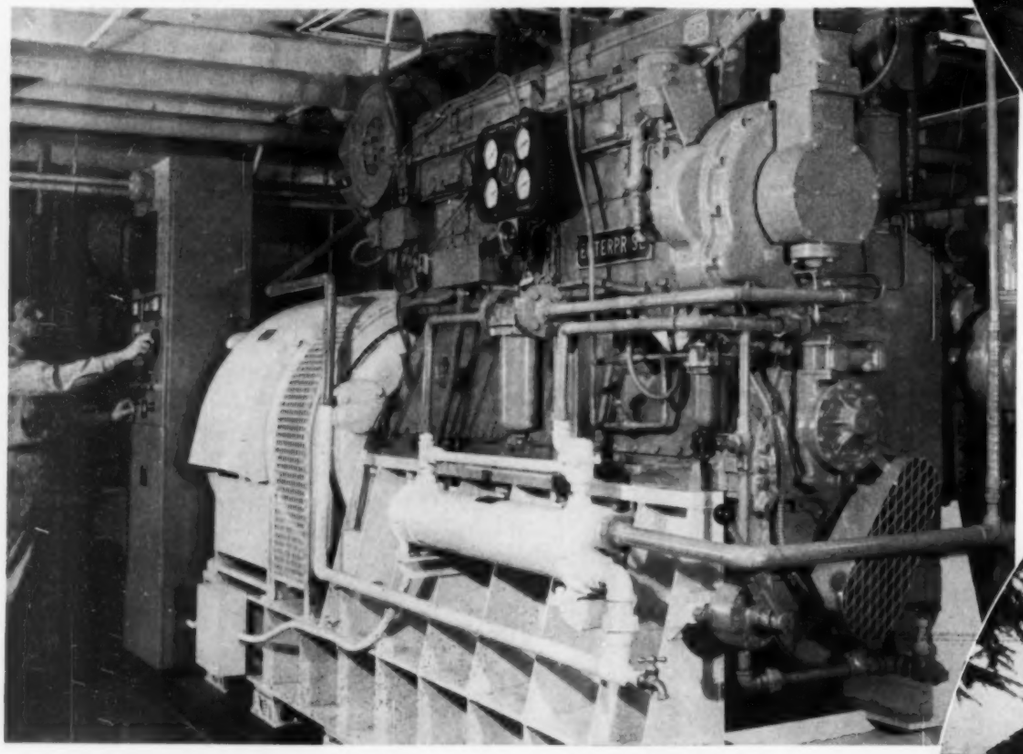
The turbocharged D-817 has an 817 cu. in. displacement. Maximum rated horsepower is 375 at 2100 rpm; maximum torque is 1038 lbs./ft. at 1450 rpm. Buzard says that it is the most powerful engine ever built by International Harvester, adding that it was especially well engineered for toll road and other long distance hauling operations. Design features include fuel injection under pressures to 20,000 lbs. per sq. in. by individual camshaft-actuated multi-orifice injectors, twin-plunger IH metering pump, dual intake and exhaust valves, aluminum alloy pistons, wet cylinder sleeves and fully-counterbalanced Tocco-hardened crankshaft with seven main bearings.

WEST COAST HOSPITALS RELY ON DIESELS

By F. HAL HIGGINS

MODERN hospitals must not fail in service to their patients and to get the drama of the diesel electric plants that stand like policemen on guard to take over instantly in case of emergency, the writer looked in on a few California hospitals and then interviewed engineers who have developed the know-how of installing units for this service over the years. First, a look at the diesel in the lower level of the Peralta hospital in Oakland and an interview with Chief Engineer I. B. Jones, who proved to be an old ex-mining engineer with years in charge of diesels in the mines before his 22 years at Peralta. He explained that King-Knight, mechanical and electrical engineers of San Francisco, had installed Peralta's Allis-Chalmers diesel generator set in May 1956. Before the diesel was installed the only emergency engine power was a small gasoline engine, which the diesel replaced. "There has been but one power failure in the 2½ years since Peralta's diesel was put on the job," said Jones. "An electric storm caused that and the diesel generator came on full load in 9 seconds." Once a month the set is tested with full load, and once a week it is turned over to make certain it is ready for instant service. "Take this Peralta hospital," said Jones, "surgery takes a 24-hour day call for power and light. Ditto for elevator service. In case of fire, one section of the building may be shut off. Our electric kitchen must feed the patients and staff on practically round-the-clock operation. Reason for diesel over other power is its dependability, of course."

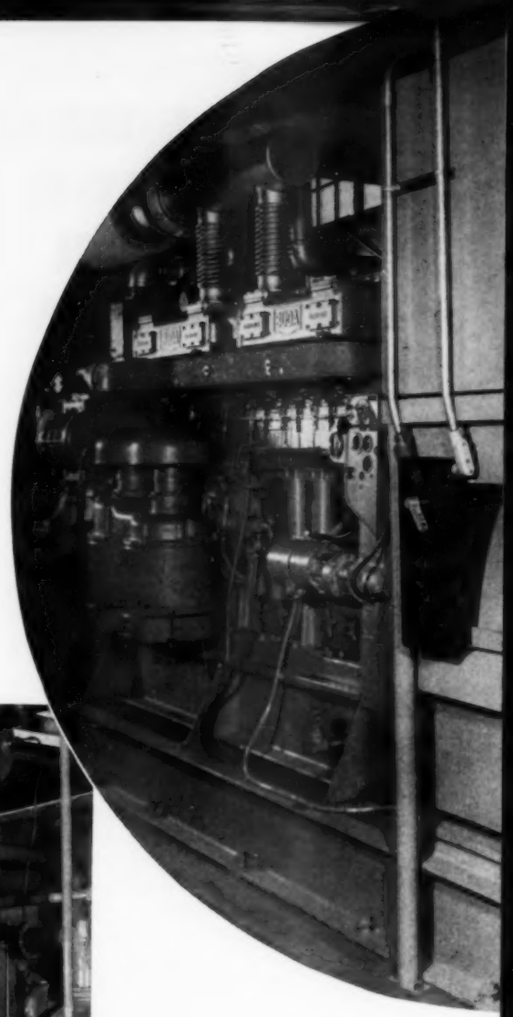
Chief Engineer Marvin C. Beck, at the Greater Bakersfield Memorial Hospital, pointed out that the Allis-Chalmers 6DA-970 diesel in combination with a 125 kw Electric Machinery horizontal synchronous generator and exciter was installed during construction of the hospital. "There have been seven power interruptions in the past six months, but only three of any consequence," Beck stated. "The last such was for 1½ hours while a major operation was in progress. Our generator automatically started with only a short delay and carried our emergency load wonderfully." The diesel is serviced by the hospital engineering department as it would be by any mobile operator and a shakedown run of 15 minutes is made once a week.



Emergency power at Burlingame's Peninsula Hospital is supplied by this DMG6 turbocharged Enterprise diesel driving a Columbia generator. Engine is equipped with Elliott turbocharger, Woodward governor. Operator is checking Alnor pyrometer.

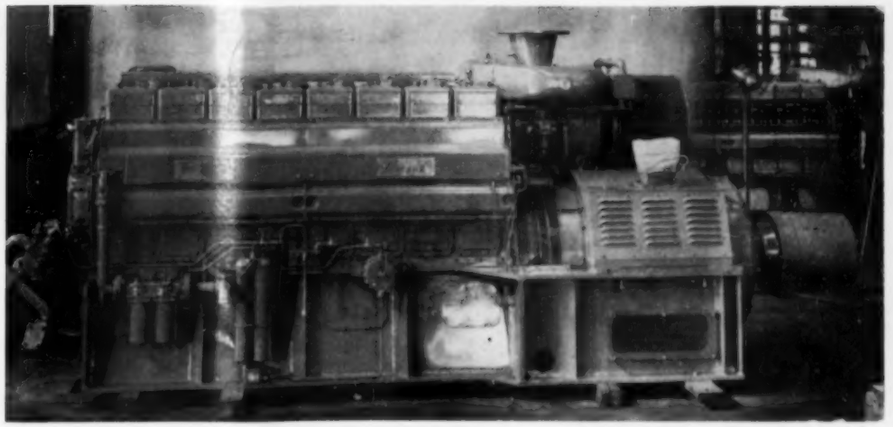
Since each hospital chief engineer pointed across the bay to a firm in San Francisco as the engineering firm that sold, installed and serviced these hospital diesels, a visit to the firm of King-Knight, mechanical and electrical engineers, on the rim of Fisherman's Wharf, brought more answers.

"We've been selling power to hospitals for the past 20 years or so," said K-K's manager. He handed



Allis-Chalmers 300 kw diesel generating set at Peralta Hospital in Oakland. Note DeLuxe filters & Vortox cleaners.

Model 6DAG-970 125 kw Allis-Chalmers generating set at the Greater Bakersfield, Calif. Memorial Hospital.



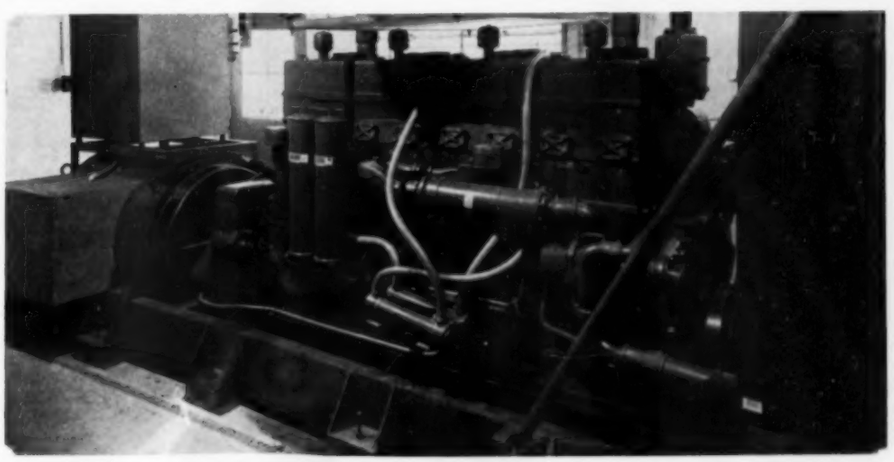
Shop view of Sterling diesel generating unit for installation in the new Stanford University Hospital in Palo Alto. Engine is equipped with Elliott turbocharger and Woodward governor and drives Electric Machinery generator.

over a piece of the firm's literature with 42 hospitals listed as King-Knight stand-by jobs. There has been more power installed and the jobs for power in hospitals have increased in recent years. Formerly a hospital needed such power for only lights and elevators, now they must supply a full range of essential services in the event of power failure. The King-Knight engineers here referred to the new Stanford University hospital where it is installing a Sterling diesel engine with an Electric Machinery generator. Mercy hospital at Bakersfield has installed an Allis-Chalmers 6DAG-970 150 kw diesel plant and Sacred Heart hospital at Spokane has an Allis-Chalmers 8DCG 2505 engine driving a 250 Kato generator. The Peninsula hospital in Burlingame has an Enterprise DMG6 diesel engine with Columbia generator.

Hospitals are not alone in finding they are getting sound insurance by installing diesel stand-by generators, say the King-Knight engineers. They have been installing them in department stores, office buildings, hotels, the San Francisco Hall of Justice, Alameda County's Hall of Justice, sewage disposal plants, and the new Bank of America building in San Francisco.

Mercy Hospital in Bakersfield, Calif. has a 125 kw Allis-Chalmers diesel generator set.

Allis-Chalmers diesel at Sacred Heart Hospital in Spokane drives a 250 kw Kato generator. Note DeLuxe filters.



CONTINENTAL'S GAS TURBINE COMPRESSOR

Another Gas Turbine Progress Report

VARIOUS types of gas turbine driven air compressors have been described recently in this magazine and this month we direct our attention to the model TC-106 as produced by Continental Aviation and Engineering Corp., an affiliate of Continental Motors Corp. This unit consists of a trailer mounted enclosure which houses a Continental model 141 gas turbine engine and related equipment. It is used for supplying compressed air to pneumatic starters for jet aircraft engines, electrical generators and ground air conditioning of aircraft. It is designed to deliver a minimum of 1.5 lbs. of air per second at 45 psia on a 130° F. sea level static day. Incorporated in the unit is a single-stage centrifugal compressor, an annular combustor and two-stage axial flow turbine. The basic engine also includes an integral oil system, ignition system, starter-generator, fuel pump, governor and acceleration control. Compressed air is bled through a 4 in. port in the side of the engine turbine housing. The trailer consists essentially of a four-wheeled chassis, upon which the engine, engine enclosure, fuel tank, air hose, batteries, instrument panel, winterization kit and other accessories are mounted.

As indicated in Fig. 1, air enters the compressor through a streamlined duct designed to provide uniform flow with minimum losses. The compressor rotor consists of two elements; an axial inducer and a centrifugal impeller. The axial inducer initiates compression and provides a smooth entry of the air into the centrifugal impeller where additional energy is added. The high velocity air leaving the centrifugal impeller is converted into pressure in a two-stage diffuser, consisting of a radial and axial stage, from which it discharges into the combustion chamber.

In the combustion chamber, the primary air follows two paths before entering the primary combustion zone. Part of the primary air flows along the rear face of the compressor diffuser support plate, and enters the upstream side of the primary combustion zone through a swirl plate which is designed to direct three rows of air jets in alternate directions. Two of the rows of air jets oppose the direction of rotation of the fuel injected from the centrifugal fuel nozzles in order to obtain a complete mixture of fuel and air for combustion. The remainder of the primary air flows along the combustor housing through hollow turbine nozzle blades and enters the downstream side of the primary combustion zone through a series of holes in the inner combustor basket. This air enters as straight jets to promote further mixing of the fuel and air products. Secondary air, to cool the primary combustion products to the desired turbine inlet temperature, is injected through the perforated inner and outer combustion chamber baskets. The passage of air into the inner basket also provides a simple and economical method for cooling the turbine nozzle blades and the compressor-turbine shaft. The gases leaving the combustion chamber are ejected through a fixed area exhaust nozzle after passing through the axial flow turbine.

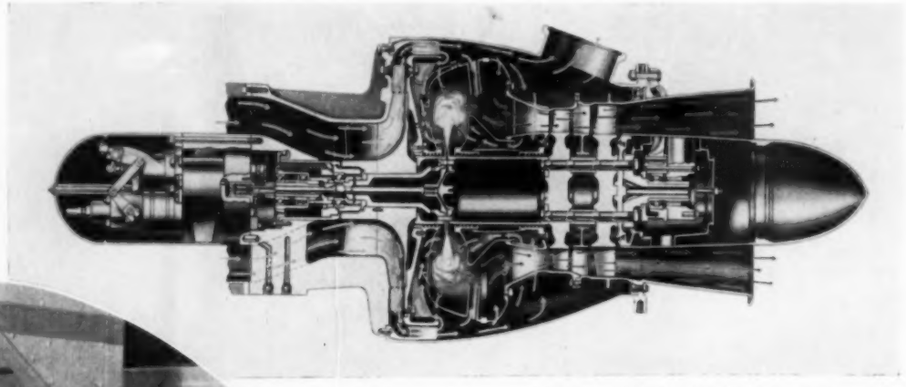
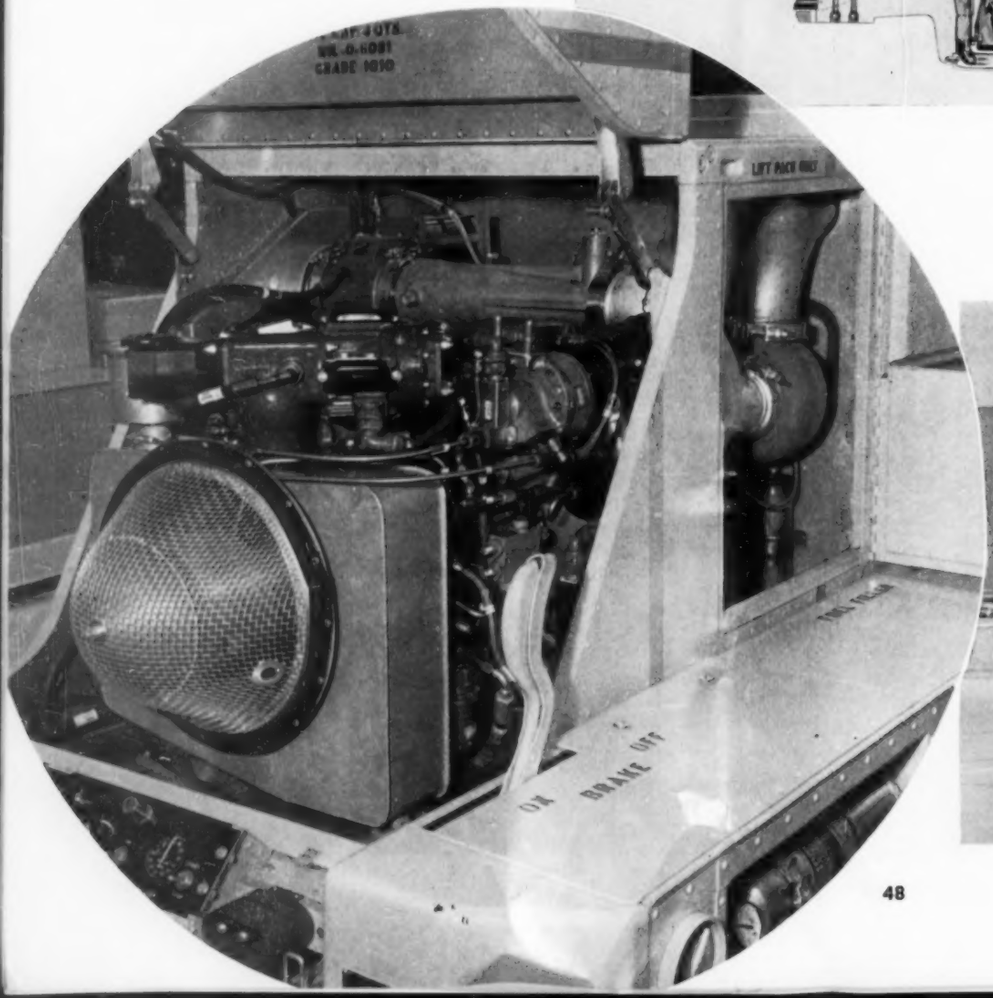


Figure 1., longitudinal section of the Continental 141 turbine and air flow diagram. ➡



Gas turbine engine is shown mounted in trailer ready for delivery. Sections of sonic nozzle bleed-off are connected by Marman couplings and Aeroquip pneumatic and hydraulic lines are used. ⬅

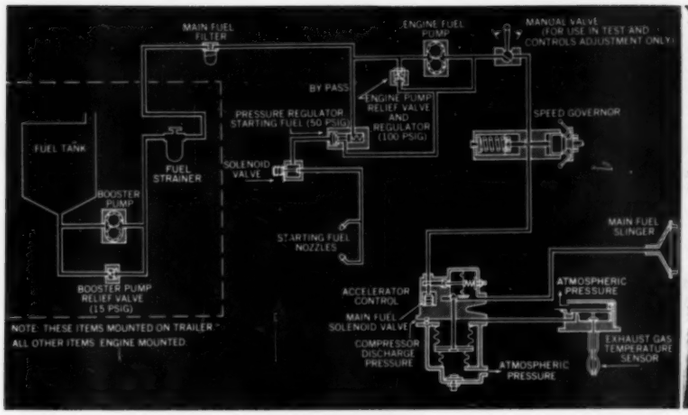


Figure 2., schematic diagram of the fuel system.

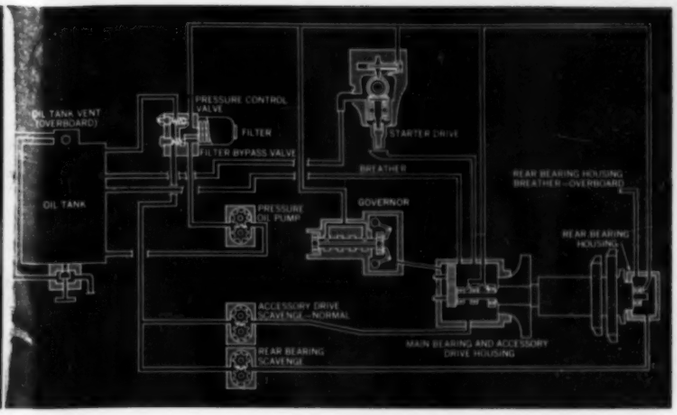


Figure 3., schematic diagram of the lubrication system.

As indicated in the schematic drawing, Fig. 2, fuel is drawn from the trailer tank by an electrically-driven booster pump, mounted on the trailer. From the booster pump, the fuel flows through a strainer, through the main fuel filter, and then to the engine fuel pump. After the engine pump, the flow divides into two paths. At this point, an engine fuel pump relief valve and regulator are provided to regulate engine fuel pressure (100 psig). Starting fuel feeds through the starting fuel pressure regulator and solenoid valve before reaching the starting fuel nozzles. Main fuel, upon leaving the engine pump, passes through the speed governor to the acceleration control, which houses the main fuel solenoid valve. Flow is then directed to the combustion chamber through a hollow tube running through the center of the turbine shaft to a centrifugal fuel distributor (called a "fuel slinger"). This distributor, which is an integral part of the turbine shaft, distributes fuel into the annular combustion chamber. The pressure required to inject and atomize the fuel is developed by centrifugal force, created as the fuel is ejected outward through radial passages in the slinger.

As shown in the schematic diagram, Fig. 3, the main oil pump draws from the engine oil tank and feeds to the oil filter. A bypass valve permits the oil to bypass the filter, if it should clog. The pressure regulating valve controls pump discharge pressure by by-passing oil back to the tank, thus maintaining approximately 40 psig oil pressure. Oil is fed to front and rear bearings, to the governor, and to the starter-generator drive gear case. Two sections of the main pump function as scavenge pumps to return oil from the rear bearing and upper and lower sides of the front bearing and accessory drive gears. All scavenge oil is returned to the main tank. This tank also acts as an oil cooler. Oil for the turbine shaft rear bearing is fed through passages in the rear oil seal housing. The arm of this housing extends upward through one of the streamlined struts in the exhaust diffuser. Front and rear labyrinth seals retain the oil. Oil to the front bearing is directed through the struts in the compressor housing. Passages and clearance areas within the compressor housing and accessory gear case permit circulation of the oil to the gears and bearings and seals are provided at the front and rear of this section.

Final assembly area for turbine-compressor trailers at Continental's Toledo, Ohio plant.

A Lockheed F-104 is started by one of the Continental TC-106 units.

Mr. Ray Powers, vice president and assistant general manager of Continental Aviation and Engineering, left during delivery of air compressors to the Air Force.

WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **BERNARD W. LANSDOWNE**

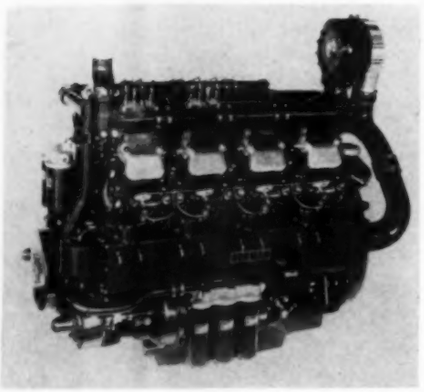
Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as a former editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C. Ltd., Southall, following which he served some five years with that company's sales engineering department. He is now manager-for-the-United Kingdom of a group of business and technical publications.

Dorman's New Vee-Eight

W. H. Dorman & Co. Ltd. of Stafford is building 8-cylinder V-type diesel engines known as the QVA series to supplement its existing in-line Q range. Both normally-aspirated and pressure-charged types are available, giving an effective maximum output of up to 455 bhp. Two banks of 6¼ in. bore x 6½ in. stroke cylinders are arranged at a 90° angle and have a swept volume of just over 26 litres. The maximum designed speed presently is set at 1800 rpm with mean piston speed of 1940 rpm.

The new vee units make use of a number of components common to the existing in-line design, including pistons, liner valves and filters. Beyond this point, changes in component design are very marked. The connecting rod arrangement on the new engines is side by side, with the rods working on a common crankpin. The rods are H-section alloy stampings. The big ends are split at 55° to the centreline of the rod to allow the rods to be withdrawn through the cylinder bores and at the same time provide maximum support for the bearing area in the rod. Four setscrews secure the dowel-located cap. The big end bearings are of the thin-wall, steel-strip type, lined with copper lead, while the small end bush is made from silicon bronze. The centre of the rod shank is drilled for gudgeon pin lubrication.

The crankcase and cylinder unit is a one-piece cast iron structure extending below the crankshaft centreline. Large side cover plates are fitted on both sides to facilitate internal inspection and removal of the connecting rod big ends. Chrome-hardened, detachable wet-type cylinder liners are employed. These are manufactured in centrifugally cast and high grade iron; they are located by a flange at the top and sealed by two sealing rings on the lower spigot. The crankshaft is an alloy steel stamping with induction-hardened pins and journals. It is underslung from the 5 in. diameter main bearings and is dynamically balanced and counterweighted. The main bearings are of the thin-wall, steel-strip type, lined with copper lead. Detachable steel, copper lead-faced thrust washers are located on either side of the rear main bearing cap to eliminate heavy compression loads from the crankshaft when axial thrusts are involved. The crankpins are 4¼ in. diameter and the journals are 5 in. diameter.



Dorman's new 8-cylinder V-type pressure-charged QVA series diesel engine.

The low expansion aluminum alloy pistons are fitted with three pressure rings, and slotted oil rings above and below the gudgeon pins. The push-fit gudgeon pin, which is 2½ in. in diameter, is made of case-hardened alloy steel.

Unlike the incline Q-type engine, separate cylinder heads are used in the vee units. They are in high grade iron, with both exhaust and inlet ports water-cooled. The cylinder heads are fitted with aluminum rocker boxes and covers. The rocker brackets are an integral part of the rocker box. The valve guides are of the pre-finished type, made in hardened and tempered iron alloy. One inlet and one exhaust valve is used for each cylinder. The valves are stellite faced and tipped. The exhaust valve stems are chrome flashed. Detachable, pre-finished valve seat inserts are fitted, these being made in high-chromium iron. Two camshafts are employed, each mounted high up on the inside of the vee in its respective cylinder bank. Bucket type tappets and push rods are employed for operating the rockers and valves. All working surfaces of the valve train are hardened.

The lubricating oil pump, mounted on the rear main bearing cap, draws oil through a detachable strainer located in the sump. The oil is pumped through a large capacity triple-element filter fitted with replaceable impregnated paper elements. A Glacier centrifugal bypass filter also is incorporated in the lubrication system. The relief valve is externally fitted to the engine. Pressure lubrication is supplied to all main bearings, crankpins, gudgeon pin bushes, camshaft bearings and rocker gear. The cams and tappets are lubricated by an oil bath fed by an oil drain from the cylinder heads. An oil temperature stabiliser can be fitted to the engine or supplied loose.

Engine cooling water from a gear-driven circulating pump passes through the cylinder jackets and cylinder heads. The system incorporates twin parallel-flow thermostats which bypass the coolant until a predetermined temperature is reached. Radiators to suit temperate or tropical duties can be supplied. The fuel injection equipment includes two Simms four-element fuel pumps mounted within the cylinder vee and driven tandem from the rear of the engine. A diaphragm type fuel lift pump is fitted to one of the fuel pump bodies. The nozzle holders are externally located on the outer sides of the vee. Multi-hole nozzles are employed; each unit is pre-calibrated. A large capacity twin parallel-flow fuel filter is employed. It is fitted with easily removable, impregnated paper filter elements.

The timing gear train, which provides the drive to the two camshafts and fuel pumps, is situated at the rear of the engine. Helical gears are used throughout. A gearcase at the front of the engine provides the drive for the water pump and dynamo. Provision for two auxiliary power take-offs is made. On the turbocharged versions a single blower is used and is mounted at the rear of the engine. Either B.S.A. or Holset turbochargers are used. Two heavy-duty air cleaners are supplied for the turbocharged engine. Electrical equipment includes twin axial starter motors.

Organizational Changes Announced by General Motors

A number of organizational changes have been announced by General Motors. Mr. Nelson C. Dezendorf was elected a member of the corporation's board of directors and will be vice president in charge of the Dayton, Household Appliance and Electro-Motive group. This group, in addition to Electro-Motive, includes Cleveland Diesel, Diesel Equipment Divisions and General Motors Diesel Ltd. Mr. Richard L. Terrell was elected a vice

R. L. Terrell

N. C. Dezendorf

president of General Motors and was appointed to succeed Dezendorf as general manager of the Electro-Motive Division.

Following his appointment, Terrell named Mr. B. B. Brownell, former chief engineer, to the newly

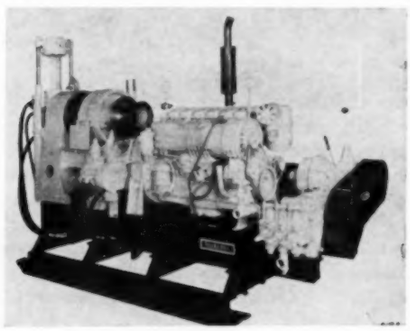
T. B. Dilworth

B. B. Brownell

created post of director of engineering and research. Succeeding Brownell is Thomas B. Dilworth, former assistant chief engineer.

Special Diamond Drill Is Powered by Diesel

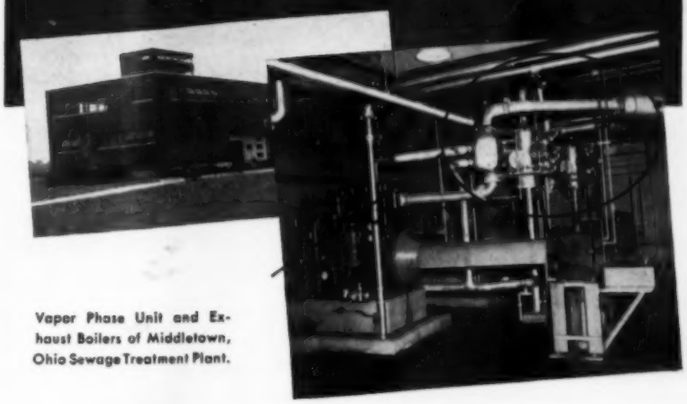
Shown here is a special Longyear 44 diamond core drill. Unlike standard models of the 44, this one is equipped with a built-in multi-speed drilling pump (at the right). The 44 is rated for drilling from 1800 ft. with NW rod to 3000 ft. AW rod. It has



a planetary hoist, four speeds forward and one reverse and twin hydraulic swivel head. The diamond core drill is powered by an F6L 712 Deutz air-cooled diesel engine, which has a maximum continuous output of 66 hp at 2300 rpm. The 312-cu. in. engine weighs less than 1000 lbs.

VAPOR PHASE

Recovers Waste Heat . . .
Cuts Maintenance And Fuel Costs
At New Middletown, Ohio Sewage Treatment Plant



Vapor Phase Unit and Exhaust Boilers of Middletown, Ohio Sewage Treatment Plant.

REDUCES WEAR ON ENGINES

The Vapor Phase System permits the utilization of normally wasted engine heat to maintain uniform operating temperature, markedly reducing wear on cylinder walls. Result: cleaner engine operation, fewer breakdowns, longer service-life.

PRODUCES STEAM FOR HEATING SLUDGE DIGESTERS

Vapor Phase recovers engine heat in the form of low pressure steam which is injected directly into sludge digesters.

PERMITS USE OF RAW SEWAGE GAS

Middletown's engines will use raw sewage gas as fuel. Because the engine temperature is kept above the dew point of the gases in the combustion chamber, condensation is eliminated, minimizing corrosive wear of liner and ring metal.

Call or Write for More Information about Vapor Phase . . . and How It Can Be Applied to Your Sewage Treatment Operation!

E C
VAPOR PHASE

ENGINEERING CONTROLS, Inc.

611 E. Marceau St.
ST. LOUIS 11, MO.

1939 Hillhurst Ave.
LOS ANGELES 27, CALIF.

DIESEL SERVICE PROGRESS

A COMMENTARY BY **GEORGE R. MACKEY**

George R. Mackey was long associated with Detroit Diesel Engine Division of General Motors Corp., and had prior experience as a mechanic in Europe and the U.S.A., which enabled him to become well acquainted in the diesel and service fields and to obtain a broad scope of the service industry from the customer's and management's viewpoint. Further training at Carnegie Tech and in the Army Ordnance during World War II provided the necessary requirements in planning service programs. Progressive advancement in diesel service areas in General Motors and with Detroit Diesel led to his position as Supervisor of Service Promotion. Upon termination of employment with General Motors in 1952, he joined Clayton Manufacturing Company, and his present position with this organization is Sales Manager of the Dynamometer Division.

A Well-Trained Field Service Organization

THE continued expansion of the diesel engine market, diversified applications for diesels and the owners' demands for on-the-job quality service has created the need for a well-trained field service organization. This field organization is the eyes and ears of the modern engine service operation. Without it, many customers would be dissatisfied, often lost, and the reputation and service volume of the department would be seriously depreciated. Its contribution to the overall gross profit of the sales, service and parts departments is an important part of the distributor/dealer operation. As a result, a fully qualified field representative is one of the most important members of a service department because he has many responsibilities. He must maintain accurate records of his business transactions, be a capable instructor in the operation and maintenance of equipment, be qualified to handle all types of engine installations, perform complete quality service and prepare service estimates. In addition, the man for this job must be a salesman, diagnostician, mechanic and diplomat.

Only Customer Contact

Very often the field service representative is the customer's only contact. Therefore, he must be one of the most experienced and best trained members of the organization. Only with this understanding of service requirements can he fully satisfy the customer's needs relative to engine operation and maintenance, factory recommendations, periodic inspections and adjustments. It is only natural that many service mechanics aspire to the position of service representative without sufficient qualifications to make this possible. However, an alert service manager will recognize the favorable characteristics of certain individuals for this important position through advancements and subsequent training.

The proper selection for this position is a serious matter. The right man for the job could enhance the department's reputation and business potential; the wrong man could tear down the reputation and good will which had been built up over a period of years. After a man of the right caliber is selected, his training requirements must be determined. While many methods are employed, one very effective approach is the use of a training form. A sample below illustrates how a service manager can determine the required training, and maintain a record of accomplishments:

Name: _____

Date: _____

Knowledge	Skill	Record

Record Symbols:

1. Training Required
2. Training Started
3. Training Completed

Analyze Capabilities

In the knowledge column, the necessary qualifications can be listed. Items relative to the responsibilities of the position can be shown in the skill column. By analyzing a man's capabilities against the knowledge (qualifications) and skill (responsibilities), the necessary training can be determined. After the points of training required have been indicated, and the most effective method of training is selected, a record can be kept of the man's accomplishments.

Other factors needed to establish the representative's utmost effectiveness are the support and assistance which will be provided in the way of tools and equipment, additional training, and a continuous flow of product information through factory manuals and bulletins. In the area of tools, equipment and parts, the requirements must first be established and procedures set forth pertaining to the inventory and necessary replacements. Definite procedures should be established covering the removal and return of parts stock. As it pertains to the continuation of training, the representative's expected participation in refresher courses and periodic on-the-job training should be outlined. This complete understanding by the representative will result in higher morale and the fulfillment of his responsibilities.

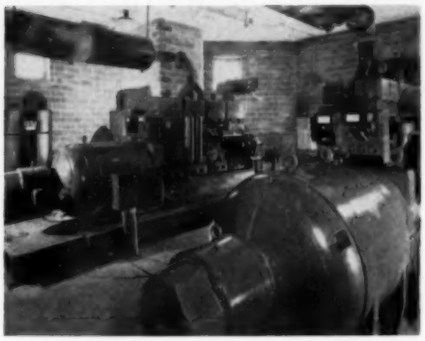
Set Definite Standards

With the establishment of a field service organization, definite standards or measurements of effectiveness should be considered. One of the methods employed for accumulating the results is the use of a monthly record. Such a record would include the gross dollar service and parts volume, customers serviced, cost per call, percentage of do-over work or comebacks, and other information.

Only through proper organization and planning can the full effectiveness of a field service organization be realized. Only then will the representatives be able to fulfill their responsibilities, assure customer satisfaction and participate in the profitable operation of the Service Department.

Allis-Chalmers Generators Operate Seaway Locks

During construction of the Iroquois Lock on the St. Lawrence Seaway and before the Ontario Hydro sub-station was completed, two Allis-Chalmers diesel generators supplied all the lighting required. Today, these generators—and two identical models at Cote St. Catherine and St. Lambert



These two Allis-Chalmers 275 kw diesel generator sets are installed in the control tower building at the Iroquois Lock.

Locks in the Seaway system—are used to operate bridges and locks and supply light and heat in the event of a power failure. The four 275 kw generators operate at 550 volts and are driven by diesel engines, each with a capacity of 450 hp at 1200 rpm. The diesels are cooled by lock water lifted by pumps driven by 250 hp Allis-Chalmers motors.

Exhaust Snubbers Quiet Dozen 550 hp Engines

Continental Oil Company's natural gasoline plant at West Short Junction in Cleveland County, Okla., has attracted much attention because of its low operation and maintenance cost and efficient operational features. Knowing that the exhaust from its dozen 550 hp engine compressors could produce an excessively high level of noise, a Burgess-Manning BES-12 exhaust snubber was included

Twelve 550 hp engine compressors installed at the West Short Junction natural gasoline plant, showing the Burgess-Manning snubbers.

with each unit by the manufacturer, Southwest Industries, Inc. To take advantage of the prevailing winds and assist the fans in the cooling operation, the compressors were located at the edge of the plant with their radiators facing south. Because the exhaust manifolds also extend to the south, the snubbers were installed in a vertical position to discharge exhaust gases well above the roof level.

Welded Aluminum Alloy on Aluminum Piston

Ever hear of a zebra-striped piston? Shown here is an aluminum diesel engine piston with welded zones of a super-hard, wear-resistant aluminum alloy recently developed by Alcoa Research Laboratories, Pittsburgh, Pa. Four of the new alloys were applied to the part in preparation for a ring groove test. Alcoa reports that aluminum castings and forgings with such precision-welded zones of super-hardness and wear-resistance retain these properties even at very high temperatures.

Alcoa believes that aluminum parts, with zones of the hard welding metal, may find use in many automotive applications—for piston ring grooves, brake drums and valve seats among others.

The World's Leading Manufacturers of

FUEL INJECTION EQUIPMENT

for Diesel Engines

Depots and Service Agents in over 100 countries

C.A.V.

FUEL INJECTION EQUIPMENT DIVISION OF

LUCAS ELECTRICAL SERVICES, INC.

Head Office: 501 West 42nd Street, New York 36
Sales Office: 14820 Detroit Avenue, Cleveland 7, Ohio
West Coast: 5025-29 W. Jefferson Blvd., Los Angeles 16, California
Branch Offices: 643 7th Street, San Francisco, California
4937 West Belmont Avenue, Chicago 41, Illinois
400 South Edgewood Avenue, Jacksonville, Florida
Canadian Distributors:
Joseph Lucas (Canada) Ltd. *Head Office:* 11 Davies Avenue, Toronto 8, Ontario
Branch Office: 3401 St. Antoine Street, Montreal 30, Quebec

Ball Named Manager Of White Advertising

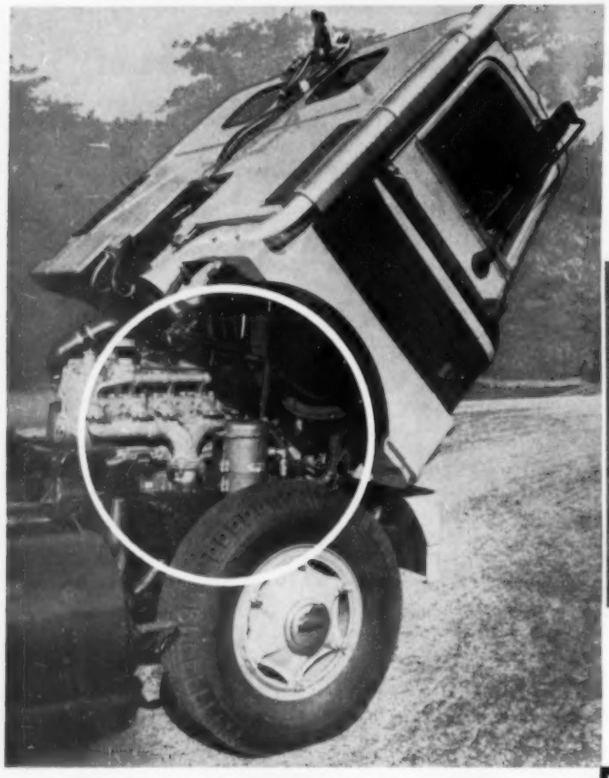
Appointment of Mr. Bernard C. Ball as advertising & sales promotion manager for White Diesel Engine Division, The White Motor Co., has been announced by Mr. William F. Burrows, vice president and general manager. Ball received his bachelor of arts degree from Marshall College and his masters degree from Ohio State University. He has been active in advertising and advertising agency work since 1946. He was one of the original organizers of the Advertising Club Springfield and served as its first president.

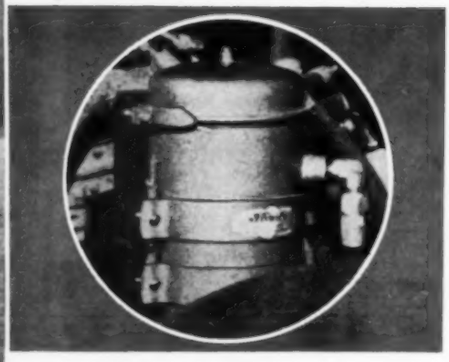
Package Compressor Bulletin

A new 12-page bulletin on the Cooper-Bessemer series-turbocharged Type GM-XC compressor is available. The bulletin describes construction details on the 9¾ in. bore by 10½ in. stroke V-angle compressor units for pumping services from 440 to 1100 hp. Available as non-skidded or completely prepiped and skidded units, these integral engine-driven compressors are designed for heavy duty requirements on pickup, gathering, field storage, repressuring and gas processing services. For bulletin No. 90, write The Cooper-Bessemer Corp., Mount Vernon, Ohio. ITS NEW

Now **WHITE** Diesels are standard

...with **WINSLOW CP*** full-flow oil filters!





TWO filters in ONE!

New CUMMINS Diesel-powered WHITE 5000 with Winslow CP* Filter—PROOF again that leading truck manufacturers give you THE BEST in filters!

There's a Winslow CP* element to fit your filter—any standard type, gasoline or diesel, fuel or lube oil. Switch to Winslow for long engine life!

Write for name of Distributor in your area

TWO materials—Fine and Superfine—in each Winslow CP* element continuously self-adjust pressure, give TRUE full-flow of filtered oil—without incurring excessive back pressures.

*Controlled Pressure. Patented, U. S. and foreign patents.

Let WINSLOW help you Capture Big Drip and Little Drip!

WINSLOW

ENGINEERING & MANUFACTURING COMPANY

4069 Hollis Street, Oakland, California, OLympic 2-0288

GM Diesel Ltd. Changes Field Personnel

Three changes in field personnel have been announced by General Motors Diesel Ltd., London, Ont. Mr. G. M. Lynch has been appointed district manager for British Columbia. He formerly was district manager for the three Prairie provinces. Mr. Walter Bedford has been promoted to district manager for Alberta, Saskatchewan and Manitoba. He had been district service manager for Ontario and western Quebec. Mr. G. L. Stephenson, formerly engaged in engine scheduling and liaison activities at the London office, has been appointed district service manager for Ontario and western Quebec. He will make his headquarters at London.

12 Norwegian Boats Get Napier Engines

Launched in August off Mandal, Norway, was the first of 12 *Nasty* class high speed patrol boats. It was powered by two 3100 hp Napier Deltic T18-37K diesel engines. The engine order for the 12 boats is valued at £1¼ million. The order was placed by the Royal Norwegian Navy within six months of the prototype launching. This boat, which was built by Boat Services Ltd., Oslo, Norway, recently made a record crossing of the North Sea at an average speed of nearly 40 knots. The production *Nasty* has certain modifications, including the addition of Napier turbocharging to give the vessel considerably higher cruising and maximum speeds. This makes it the fastest piston-engined patrol boat in the world, Napier claims.

GAC-2 Engine Brochure

A new brochure describing American Marc's new GAC-2 natural gas engine is now available. The brochure gives full operational information, field-test data, prices and complete specifications on the GAC-2, which is adaptable to a wide variety of applications, including: prime power for pumps, compressors and generators; liquid transfer and shallow well pumping. For copies, write American Marc Inc., 1601 W. Florence Ave., Inglewood, Calif. ITS NEW

NEW AND NOW AVAILABLE! The completely new 1959 edition of the **DIESEL ENGINE CATALOG,** Volume 24 can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs $10 postpaid anywhere in the world. Send checks or company orders to **DIESEL ENGINE CATALOG,** 816 N. LaCienega Blvd., Los Angeles 46, Calif.

Allis-Chalmers Appoints Four Vice Presidents

Election of two new officers and the advancement of two other officers by the board of directors of the Allis-Chalmers Mfg. Co., has been announced. Elected senior vice presidents were Messrs. Boyd S. Oberlink and J. L. Singleton. Both previously were vice presidents. Mr. Roy M. Casper, general manager of the firm's Atomic Energy Division, and Mr. L. W. Davis, general manager of the Farm Equipment Division, were both elected vice presidents.

New Penetrating Oil Available

A new penetrating oil called Rus-go has been introduced by the Babbitt Chemical Co. and is now available in both regular and aerosol type cans. According to Babbitt, the new oil is a combination of rust-eating non-acid oils with a high affinity for iron oxide. Besides loosening joints, it can also be used for cleaning rust from machinery, tools and equipment. After use it leaves a protective film on the metal surface. For further information on this new penetrating oil, write Babbitt Chemical Co., 38 Prospect St., New Bedford, Mass.

Winslow Filter Booklet

A new booklet entitled, *The Saga of Big Drip and Little Drip*, describing the principle of full-flow filtration in Winslow CP filters, has been published by Winslow Engineering and Mfg. The booklet tells in Western fashion how the desperate Drip brothers, terrorizers of shafts, bearings and all engines, may be captured simultaneously by the Winslow CP (Controlled Pressure) principle, employing two filtering materials in one element. Write Winslow Engineering and Mfg. Co., 4069 Hollis St., Oakland, Calif.

220 SHP for *Walter M*

Celtic Shipyard recently completed the installation of a General Motors marine diesel engine model 62206 in the *Walter M* owned by Frank Hole, Coal Harbour, Vancouver, Is. Vessel is 60 ft. long, has a 15½ ft. beam and a draft of 7 ft. 2 in. The new diesel is 220 shp cont., 300 hp max. and turns at 1800 rpm. It is fitted with a 4½:1 ratio hydraulically operated Allison reverse reduction coupled to a 3½ in. Monel tailshaft to turn a 3 blade propeller at 400 rpm. Supplied with engine are full flow and bypass type lube oil filters, a 60 hp 3:1 Cotta power take off clutch mounted on front of engine drives seine winch and anchor winch. Exhaust runs through a Maxim silencer. Trials were held in Vancouver and the speed of the *Walter M* was recorded as 11 knots. The vessel is engaged in the fishing industry and works for B. C. Packer. On board for trials were owners representatives and shipyard personnel as well as the service manager from Hoffars Ltd. who supplied the GM engine.

70/30 Cupro-Nickel Tube for Heat-Exchangers

A special processing of 70/30 cupro-nickel tube, employed by Chase Brass & Copper Co., makes this tube highly suitable for modern high-temperature feed water heaters and other heat exchanger applications, the firm claims. This processing provides a precise balance between the necessary strength and the necessary ductility to allow fabrication of the tube into U-bends. Designated simply as "high strength 70/30 cupro-nickel tube", Chase says the product will be specially useful in power generating stations and heating plants where high pressures and temperatures require both high strength during use and ductility for installation. The 1 in. o.d. x .049 in. wall tube supplied by Chase provides a minimum of 72,000 psi tensile strength and 15 per cent elongation. This ductility will permit U-bends to a "bend radius to O.D." ratio of 1.8. Where greater ductility is needed, for U-bend radii less than 1.8, specifications should call for a minimum of 68,000 psi and a 20 per cent elongation. High-strength 70/30 cupro-nickel tube can be furnished by Chase in straight lengths or U-bends. (ITS NEW)

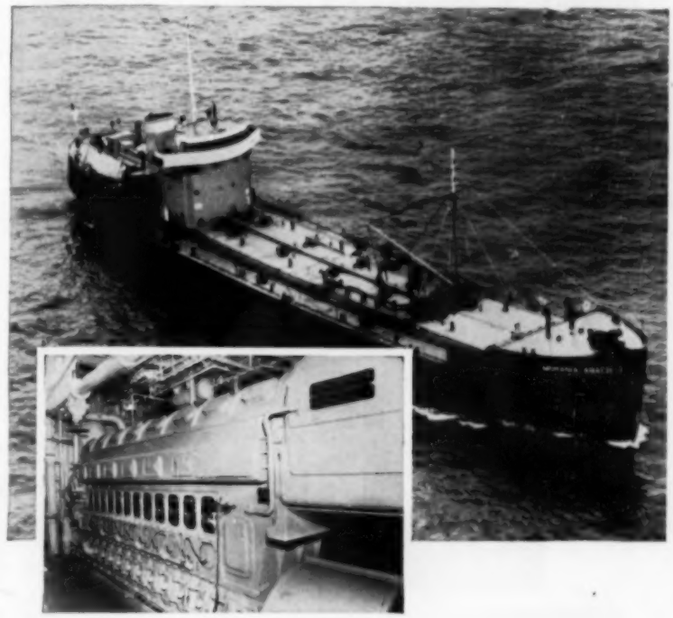
Cummins Establishes Subsidiary in Brazil

Formation of a new subsidiary company in Brazil has been announced by Cummins Engine Co. Mr. R. E. Huthsteiner, president of Cummins, said that the new Brazilian subsidiary would carry the corporate title Motores Cummins Diesel do Brazil Ltda, with headquarters in Sao Paulo. Huthsteiner said that the establishment of the subsidiary reflects Cummins' confidence in Brazil's future. The new firm will begin local production soon of major parts for Cummins diesels. All parts will be interchangeable with U. S. parts. Mr. W. A. Reeks, managing director of Cummins International, announced the appointment of Mr. Reinhard G. Scheibner as Manager—Brazilian Operations. Scheibner's prior assignment was with Cummins in Sydney, Australia.

960 HP Ship Delivered

National Steel and Shipbuilding Corp. has delivered the 127 ft. tuna cl[illegible] *Larry Roe* to its operating owners, National Marine Terminal, Inc. The *Larry Roe* is the 14th ship in the 345-ton class produced by National Steel in the last six years. Main propulsion is supplied by one Fairbanks-Morse 38D8⅛ opposed piston diesel engine developing 960 hp. The two auxiliary engines are Caterpillar Model D-342. Each 150 kw unit is capable of supplying the ship's entire electrical requirements.

NEW AND NOW AVAILABLE! The completely new 1959 edition of the **DIESEL ENGINE CATALOG,** Volume 24 can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs $10 postpaid anywhere in the world. Send checks or company orders to **DIESEL ENGINE CATALOG,** 816 N. LaCienega Blvd., Los Angeles 46, Calif.



Fairbanks-Morse O-P Power gives the new "Morania Abaco"

high-performance for hot cargo!

Capable of delivering 17,700 barrels of asphalt at 350°F. anywhere on the East Coast or in the Gulf, the new O-P powered *Morania Abaco* has literally revolutionized the asphalt industry. Time is saved; packaging, shipping and labor costs are cut to the minimum.

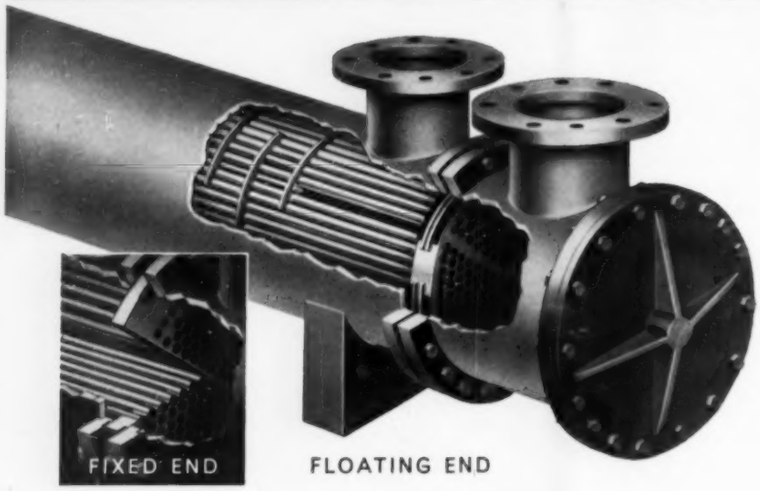
For compact power, and economy, a 12-cylinder Fairbanks-Morse Opposed-Piston diesel was selected for the *Morania Abaco*, developing 2000 hp. at 800 rpm. O-P performance gives her the extra speed and efficiency that adds to her effective operating range. Whether you're building new or repowering, call in your nearby Fairbanks-Morse Marine expert. F-M O-P diesels range from 300 to 3000 hp. Write Fairbanks, Morse & Co., 600 South Michigan Avenue, Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

DIESEL, DUAL FUEL AND GAS ENGINES • LOCOMOTIVES • ELECTRIC MOTORS • GENERATORS
PUMPS • SCALES • COMPRESSORS • MAGNETOS • HOME WATER SYSTEMS

PERFORMANCE THAT CREATES SATISFACTION!



Yates-American

REMOVABLE BUNDLE

HEAT EXCHANGERS

STEEL SHELL FLOATING HEAD • STRAIGHT TUBES

- Lantern gland type floating head permits free expansion and contraction and prevents mixing of fluids.
- Available with ⅜", ⅝" and ¾" O.D. bare tubes as well as ⅝" O.D. finned tubes. Diameters to 31".
- Standard materials—steel shell, admiralty tubes, alloy bolting. Special materials available to meet specific requirements.
- Ask for Bulletin HT-5.

ENGINE COOLING RADIATORS

Over 75 years of service to industry

HEAT TRANSFER DIVISION

Yates-American

MACHINE COMPANY

703 4th St. BELOIT, WISCONSIN

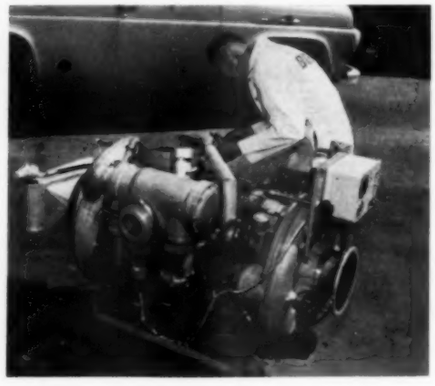
Ray West Heads New Honeywell Industrial Controls Division

R. R. West

Minneapolis-Honeywell Regulator Co. has realigned sales administration activities involving the control systems it produces for machine tool automation and other markets. Consolidated into a newly-created Industrial Controls Division are the company's control devices and machine controls departments. Mr. Ray R. West, who formerly headed the control devices section, has been named manager of the new division. A veteran of 35 years with Honeywell in the field of industrial instrumentation, West has been transferred from the firm's Brown Instruments Division headquarters in Philadelphia, Pa., to Honeywell's home office in Minneapolis. West has held a variety of sales and administrative posts since joining Honeywell in 1925.

Boeing Ground Support Unit

Boeing Airplane Company's Industrial Products Division has developed the pictured new flyaway turbine compressor, which will enable commercial jetliners to carry their own lightweight ground support into low traffic airfields. The compressor, which will provide rapid starts for large jet engines, is powered by a Boeing gas turbine and develops 205 air horsepower. This unit, weighing 470 pounds, was built for Northwest Airlines. Other flyaway units have been ordered by Pan American World Airways Pacific-Alaska Division. The unit's air delivery hose is unattached in this picture and the open compressed air outlet is



visible on the side of the engine. This identical turbine compressor is mounted in a self-propelled unit called the Boeing turbo-starter. Five major airlines have ordered Boeing turbine starting equipment.

NEW AND NOW AVAILABLE! The completely new 1959 edition of the **DIESEL ENGINE CATALOG,** Volume 24 can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs $10 postpaid anywhere in the world. Send checks or company orders to **DIESEL ENGINE CATALOG,** 816 N. La Cienega Blvd., Los Angeles 46, Calif.

Low Piston Ring Wear at New Smyrna Beach

Piston rings which retained original manufacturing tolerances after 25,000 hrs. of operation in a diesel engine burning low-grade Bunker "C" oil have been reported from the New Smyrna Beach

Shown after 25,000 hrs. of operation are piston rings of an Enterprise DSR-38 engine at the New Smyrna Beach (Fla.) power plant.

(Fla.) municipal power plant by Koppers Co., Inc. Following the long period of operation, the 2500 hp. Enterprise DSR-38 turbocharged diesel engine was taken off the line to determine wear-rate effect of the low-grade, low-cost fuel. Koppers piston rings used in the engine were still in excellent condition and still within original manufacturing tolerances. Maximum cylinder liner wear was found to be 0.001 in. while maximum piston wear was only 0.002 in. All rings were free in the grooves. The two top chrome-plated rings in all pistons were in excellent condition. Bearing surfaces of the three taperfaced rings on each piston were between ¼ and ½ of the gross ring surface. Oil control rings in all pistons were in good shape and free from fouling.

Electro-Coatings Purchases Pennington Channelcromium

Pennington Channelcromium Co., San Antonio, Tex., platers of diesel liners and aircraft cylinders, recently was purchased by Electro-Coatings, Inc., a Midwest plater and manufacturer. Electro-Coatings' main office is at Des Plaines, Ill. It has plants in Chicago, Schiller Park and Moline, Ill.; Milwaukee, Wis.; Cedar Rapids, Iowa; and San Antonio. Mr. George Altgelt is San Antonio plant manager. Mr. W. J. Suski is in charge of the plant's overall sales promotion and development

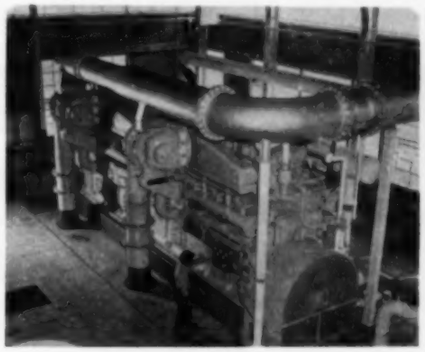
W. J. Suski

George Altgelt

activities. Channelcromium is applied electrolytically and, as the name implies, contains channels or valleys of proper depth and varying sizes of plateau area.

Brown Boveri Turbochargers

In the April 1959 issue of DIESEL AND GAS TURBINE PROGRESS, we incorrectly described the turbochargers serving the Worthington SUTC-10 engine compressor at the Navajo station of El Paso Natural Gas Co. in Gallup, N.M. The engine is equipped with Brown Boveri turbochargers.



Brown Boveri turbochargers on Worthington engine compressor at Navajo station.

NEW AND NOW AVAILABLE! The completely new 1959 edition of the **DIESEL ENGINE CATALOG,** Volume 24 can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs $10 postpaid anywhere in the world. Send checks or company orders to **DIESEL ENGINE CATALOG,** 816 N. La Cienega Blvd., Los Angeles 46, Calif.

When you specify power equipment... select

PRECISE POWER by American MARC

PRECISE POWER—the guaranteed ability of precision built American MARC power equipment to continuously deliver an unwavering flow of maximum rated power at lowest operating costs. You get exclusive PRECISE POWER design in all American MARC products, including:

New higher rated DIESEL and NATURAL GAS ENGINES, 10 to 20 HP, air and water cooled. PRECISE POWER design holds engine RPM to 3% maximum variation.

GENERATORS and GENERATOR SETS ranging from ½ to 100 KW, AC and DC, 400 and 60 cycle, in permanent, conventional wound and static excited types. PRECISE POWER controls voltage and frequency regulation to values of less than ¼ of 1% in most models.

Our nation's Armed Services demand the ultimate in dependability—they have standardized on American MARC PRECISE POWER Diesel equipment.

Write for complete catalog and prices, today.

Diesel Engines from 10 to 20 HP, Air and Water Cooled – Natural gas engines 15 HP, Air Cooled

Diesel Electric generating sets from 2½ to 7½ KW, AC and DC - Generators from ½ to 100 KW

Manufacturers of Natural Gas Engines, Diesel Engines, Generators and Generator Sets.

Distributors in major marketing areas of the United States, Canada and Latin America.

Representatives in the Near East, Far East, Europe and The United Kingdom.

AMERICAN MARC INC.

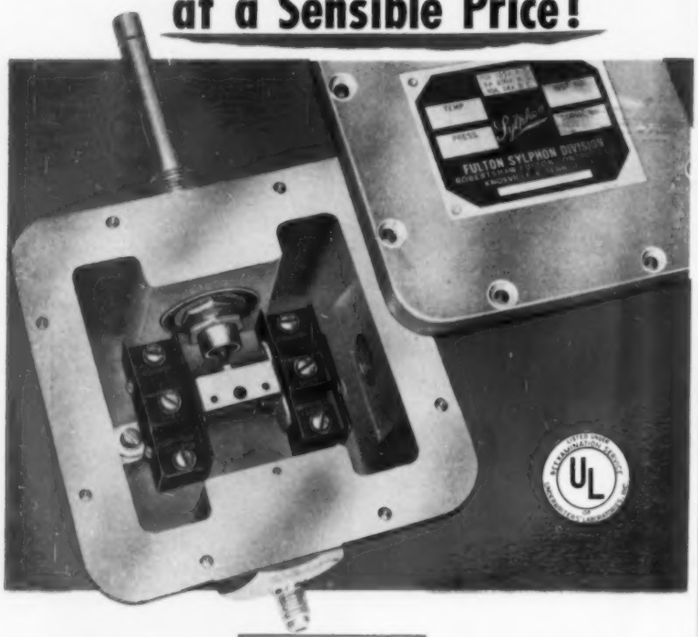
Dept. D • 1601 W. Florence Ave., Inglewood, Calif.

Natural Gas Engines • Diesel Engines • Generators • Generator Sets

Golden Isles Story Told in Fall *Production Road*

The story of the Golden Isles housing development is told in the Fall issue of *Production Road*, Twin Disc Clutch Company's quarterly magazine. Golden Isles is located in Florida midway between Miami and Fort Lauderdale. At a cost of $4 million, 340 acres of mangrove swampland were reclaimed and converted into nine man-made islands. The problems involved in this undertaking and how they were surmounted are described. Another story deals with a new oil well drawworks which features a 42 in. low drum clutch—the biggest Twin Disc Clutch ever built. Articles of interest on logging, metalworking and marine installations also are included.

New Explosion-Proof Switch for Temperature or Pressure at a Sensible Price!



GIVES 4-WAY ACTION

Fully approved by Underwriters Laboratories for Class 1, Group D installations where atmospheres are hazardous, this new No. 542 switch gives you new safety . . . and new savings, too!

This new Fail-Safe switch responds to temperature or pressure and sounds alarm, flashes warning light, operates pilot or stops internal combustion engines if oil pressure drops to danger point or cooling water temperature is too high.

Available in a wide variety of switch ratings and contact arrangements, for either temperature or pressure, or combination. Any 20° adjustable temperature range from 130° F. to 245° F.; adjustable pressure range 5 to 25 psi; maximum pressure 75 psi.

FOR COMPLETE INFORMATION, WRITE FOR BULLETIN VD-112

Robertshaw-Fulton CONTROLS COMPANY

FULTON SYLPHON DIVISION • Knoxville 1, Tenn.

Details about two new Twin Disc products are disclosed. One is an electromagnetic clutch which Twin Disc is now manufacturing under license from the German clutch-making firm of Ortlinghaus-Werke GmbH. The other is a high-energy, high-speed power take-off for engines developing 300 to 500 hp. It features a unique ventilated center plate which dissipates excess heat. For a copy of *Production Road*, write to the editor, *Production Road* Twin Disc Clutch Co., Racine, Wis.

New Tug for Railroad Launched by Dravo

The first of seven modern diesel harbor tugboats under construction for the Pennsylvania Railroad was launced in September at the Neville Island ways of Dravo Corp. The new tug, to be known as the *New York*, was the first deep-water boat built at the Pittsburgh shipyard since the end of World War II. After being outfitted, the 1200-hp vessel will be towed 1850 miles down the Ohio and Mississippi rivers to New Orleans, La., and then will proceed under its own power more than 2000 miles across the Gulf of Mexico and up the East Coast to New York City. The seven new tugs will replace the last of the coal-fired steam tugs in the Pennsylvania's harbor fleet.

The *New York* is 105 ft. long, 26 ft. wide and 13 ft. 8 in. deep. It will operate at a normal 12-ft. draft. Of single screw design, the tug is powered by a GM Cleveland Diesel 12-567C engine, equipped with reverse reduction gear and Wichita clutch. Navigation aids include radio telephone for coordination of inter-harbor traffic. Subesquent launchings will be at the approximate rate of one tug every three weeks, with deliveries being concluded in January 1960. When all seven have been delivered, the Pennsylvania's New York harbor fleet will include 19 diesel tugs and four oil-fired steam tugs.

Southern Pacific Road Buys 15 Alco Units

The Southern Pacific Railroad has placed an order with Alco Products, Inc., Schenectady, N.Y., for 15 diesel-electric locomotives. The railroad will receive 12 DL-701 road switchers (1800 hp) and three 2400 hp DL-600 locomotives. Deliveries were scheduled during August and September. All of the DL-600's and six of the DL-701's were built with low-silhouette short hoods. Each of the locomotives will be equipped with dynamic braking. The 1800 hp locomotives are powered by Alco's 12-cylinder V-type model 251 diesel engine; the heavier units carry the 16-cylinder vee engine in the model 251 series.

Brooklyn Firm Named M.A.N. Service Depot

Golten Marine Co. Inc., Brooklyn (N. Y.) ship repairing firm, has made an arrangement with the Augsburg (Germany) Works of M.A.N. Corp. to provide a service depot for M.A.N. marine diesel engines. Golten Marine specializes in diesel engine repairs. Under the new arrangement, the firm will undertake repairs on M.A.N. engines in ships calling at New York or other ports on the East Coast of the United States. The company also will maintain stocks of original M.A.N. parts.

Clark Shows Gas Engine To Pipeline Companies

Representatives of leading United States gas transmission companies were the guests of Clark Bros. Co., at Olean, N. Y., last September 18 to witness a plant demonstration of the new Clark Model TPV 2 cycle, V type gas engine. The 10 cylinder turbocharged unit, rated at 4000 bhp, will be delivered soon to Columbia-Gulf Corp. for installation in its new pipeline booster station at Hampshire, Tenn. The new engine will drive a Clark centrifugal compressor in a completely automatic installation.

The demonstration included a presentation of design and performance characteristics, a series of full load runs at varying speeds and a question and answer session with Clark engineering personnel. Other engines in the TPV series include 12 and 16 cylinder models rated at 4800 and 6400 bhp, respectively. Clark engineers claim that they are the most powerful engines ever developed for pipeline service.

Engine Care Bulletins

Defeating Dirt, a new series of bulletins just published by Cummins Engine Co., give details on how to care for diesel engines to obtain maximum performance, economy and engine life. Tips are given on how to maintain engine and reduce down time and repair costs. Four bulletins deal with air cleaners, tubing, hose and clamps, breathers, filler caps and dipstick, and lube oil and fuel filters. Bulletins can be obtained from Sales Services Dept., Cummins Engine Co., Inc., Columbus, Ind.

NEW AND NOW AVAILABLE! The completely new 1959 edition of the **DIESEL ENGINE CATALOG**, Volume 24 can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs $10 postpaid anywhere in the world. Send checks or company orders to **DIESEL ENGINE CATALOG**, 816 N. LaCienega Blvd., Los Angeles 46, Calif.

Dual Circuit Breaker Design Transfer Switch Bulletin

A 4 page illustrated bulletin that highlights new relay control features of the Trans-O-Matic automatic transfer switches and illustrates a new "narrow" control center model is available from Lake Shore Electric Corp. Designed for service to 600 volts, 800 amps with interrupting capacities to 50,000 amps rms, the Trans-O-Matic incorporates a dual circuit breaker design that permits power to be mechanically transferred by a common motor-driven linkage. The design is said to assure positive transfer with no neutral position possible. The switches are available for full relay, 3 phase 4-wire service with transfer initiated when any or all legs drop below 70 per cent of normal. The unit also is available for feeder failure protection with transfer on failure of normal power. Bulletin 07500-G is available from Lake Shore Electric Corp., 205 Willis Street, Bedford, Ohio.

Fairbanks-Morse Names Los Angeles Engineer

Appointment of Mr. Robert L. Ridgway as field engineer has been announced by Mr. James G. Graham, Los Angeles branch manager of Fairbanks, Morse & Co. Ridgway previously was with the Elliott Co. in Los Angeles. He has been active in industrial engineering and sales for the last seven years. He will be assigned to handle Fairbanks-Morse equipment in the petroleum, chemical and power plant fields.

Cooper-Bessemer Canada Names Two Managers

The elevation of Mr. E. D. Van Fossen and Mr. R. L. Moore to division managerial posts, under the direct supervision of Mr. C. R. Jones, vice president and newly appointed general manager, has been announced by Copper-Bessemer of Canada, Ltd. Van Fossen becomes western district manager with offices in Calgary, Alta. Moore, as eastern district manager, will operate from Toronto, Ont.

New Diamond T Line Offers Four Diesels

A full-color, illustrated specification folder is now available on the 921D-922D, Diamond T Motor Truck Company's new coventional diesel models. A choice of four diesel engines is available in the new trucks—195 hp NH-195; 190 hp HRF-6; 220 hp NH-220; and the turbocharged 262 hp NTO-6. Diamond T's new 72 in. wide "D" cab is used on both the 921D and 922D. Aluminum is used liberally in the 922D4, which Diamond T claims is 600 to 1400 lbs. lighter, depending on specifications, than previous models. Options include three 10 and 12 speed transmissions and four 15 speed combinations, three series of rear axles and 10 different tandem rear axles. Gross combination weight rating goes up to 78,000 lbs.; gross vehicle weight rating for the 6 wheelers is as high as 60,000 lbs.

Blount Building Two Tankers for Chile

Blount Marine Corp., Warren, R.I., has signed a contract to design and build two 58 ft. x 19 ft. shallow draft crude oil tankers for Cia. Maritima de Punta Arenas, S. A., Chile. Each vessel will be powered by a GM Diesel 6-71 marine engine.

NEW AND NOW AVAILABLE! The completely new 1959 edition of the **DIESEL ENGINE CATALOG,** Volume 24 can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs $10 postpaid anywhere in the world. Send checks or company orders to **DIESEL ENGINE CATALOG,** 816 N. LaCienega Blvd., Los Angeles 46, Calif.

NOW YOU CAN STANDARDIZE WITH THE

all purpose power line

(20 TO 1650 H.P. IN ONLY 3 CYLINDER SIZES)

...and get all the benefits of GM Diesel standardization in every type and size of boat

Standardization with GM Diesel engines pays off big because fast-stepping 2-cycle "Jimmy" Diesels get work done faster—whether used for propulsion, pumping, hoisting or other auxiliary use.

GM Diesel covers the power range—20 to 1650 H.P. with only 3 cylinder sizes—compared to the 5 to 10 cylinder sizes which other Diesel manufacturers use.

Operators who standardize on GM Diesel power need stock, in most cases, only 1 size or, at most, only 3 sizes of wearing parts—maintain full protection with the smallest investment in spares.

GM DIESEL

PARTS AND SERVICE WORLDWIDE

In Canada: GENERAL MOTORS DIESEL LIMITED London, Ontario.

DETROIT DIESEL ENGINE DIVISION, GENERAL MOTORS, DETROIT 28, MICH.

Dravo Receives Order for Hudson River Tug

A modern push-type diesel towboat specifically designed for Hudson River conditions has been ordered by Cornell Steamboat Co., subsidiary of New York Trap Rock Corp., West Nyack, N. Y. To be built by Dravo Corp., Pittsburgh, Pa., the powerful twin screw vessel will incorporate hull and rudder design features developed by Dravo and refined by model basin tests in the Netherlands ship model basin at Wageningen, Holland. The contract provides for two additional towboats, which may be built at a later date. Sparkman and Stephens Inc., naval architects, will represent Cornell Steamboat Co. during construction at Dravo's East Coast shipyard, Wilmington, Del., and during the river trials on the Hudson.

Moulded dimensions of the new boat are 105 in. length, 30 ft. beam, with depth at side amidship of 11 ft. 9 in. Powered by two Fairbanks-Morse diesel engines with a combined 1800 shaft horsepower, the boat will be capable of pushing 20 crushed stone barges at approximately 4½ mph, pool water speed. The twin 7 ft. stainless steel propellers of the push-type boat are mounted in welded steel Dravo Kort nozzles. These nozzles, which in effect are hydrofoil sections surrounding the propellers, increase the boat's pushpower approximately 25 per cent at operating speeds, Dravo says. A hydraulic-operated steering system is provided for each of the flanking and steering rudders. The two flanking rudders are positioned ahead of each propeller with one steering rudder directly behind.

The bow of the new tug is of modified spoon shape instead of being pointed. Two heavy steel towing "knees" are built into the bow, one at each corner. These fixtures, extending well above and below the deck line, provide adequate contact between barge and towboat. A towing bitt at the stern enables the towboat to operate as a conventional tug when rough water conditions make the hawser towing method necessary.

Clark Issues Bulletin On Pipeline Explosions

New bulletin 173, published by Clark Bros. Co., Division of Dresser Industries, presents latest findings on the mechanism of explosions in pipelines and compressor starting air lines. Authored by Mr. Robert S. Ridgway, Standard Oil of California, the article discusses research on the nature of explosions and shock waves in piping. These observations are then applied to compressor air starting systems to provide a more thorough understanding of the origin of explosions and the propagation of shock waves within the piping. The study concludes with a discussion of preventive measures that can be taken to eliminate explosions in air starting systems. Copies of the bulletin may be obtained from Clark Bros. Co., Olean, N. Y.

Murray Joins Parker In Pittsburgh Region

Appointment of Mr. Herbert W. Murray as district manager of distributor sales in the Pittsburgh territory has been announced by Parker-Hannifin Corp., Cleveland, Ohio. Murray's district is comprised of western Pennsylvania, West Virginia and the eastern tier of Ohio counties. He will represent Parker industrial tube and hose fittings, hydraulic accumulators, check valves, manual control valves and Crown compressed air regulators, filters and lubricators.

Cummins Strengthens Its World Service Facilities

A new service organization to strengthen its service in the free world has been announced by Mr. Reece Hatchitt, director—international operations for Cummins Engine Co., Columbus, Ind. A staff of service representatives has been named to provide technical training, support Cummins dealers and instruct owners and operators on the uses and servicing of Cummins engines. The service representative-specialists have been specially trained and instructed at Cummins' two manufacturing plants, in Columbus and Shotts, Lanarkshire, Scotland. This new service organization will direct Cummins service activities throughout the free world, except in the United States and Canada. New service representatives will be located in Mexico City, Mexico; Havana, Cuba; Sao Paulo, Brazil; Buenos Aires, Argentina; Zurich, Switzerland; Lisbon, Portugal; Johannesburg, South Africa; Beirut, Lebanon; Singapore; and Sydney, Australia.

Formation of the service organization follows two significant expansion developments for Cummins—the formation of a Brazilian subsidiary to give Cummins three overseas operations, and the appointment of Mr. W. A. Reeks as managing director of Cummins Diesel International Ltd. with headquarters in Nassau, The Bahama Islands.

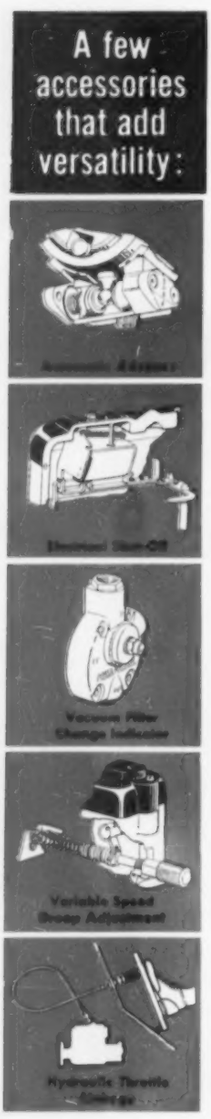
Swedish Firm Opens Brazilian Diesel Factory

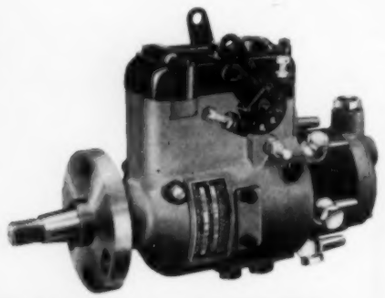
Scania-Vabis Co., large Swedish truck and bus manufacturer, has opened a new engine factory in Sao Paulo, Brazil. The plant has a current production capacity of about 100 diesel engines (type D10 or 165 hp) per month. Erik Nilsson, head of the Swedish parent company, located at Södertälje, said that the demand for Scania-Vabis vehicles was keen in Brazil. The engines will be delivered to the company's Brazilian general agent, VEMAG, which is manufacturing complete Scania-Vabis truck and bus chassis under a license agreement. Gearboxes, rear axles, and some other components are delivered from the Swedish main factory.

Fishing Vessel Powered by GM Diesel

Sterling Shipyard recently completed the installation of a GM marine diesel engine model 62206 in the *Snowfall* owned by Benny Lagos. This vessel is 67 ft. long, has a 17 ft. beam and a draft of 8 ft. The new GM diesel is 220 shp cont., 300 hp max. and turns at 1800 rpm. It is fitted with a 4½:1 ratio hydraulically operated Allison reverse reduction coupled to a 4 in. bronze tailshaft to turn a 3 blade propeller at 400 rpm. Supplied with engine are full flow and bypass type lube oil filters, a 60 hp Cotta power take off clutch mounted on front of engine drives seine winch and anchor winch. Trials were held in Vancouver and the speed of the *Snowfall* was recorded as 11 knots. The vessel is engaged in the fishing industry and fishes and packs for Canadian Fishing Co. both on salmon and halibut. On board for trials were the owner and representative of Shipyard including Mr. Dick Jack and Les Hall of Hoffers Ltd., who supplied the Jimmy Diesel.

NEW AND NOW AVAILABLE! The completely new 1959 edition of the **DIESEL ENGINE CATALOG,** Volume 24 can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs $10 postpaid anywhere in the world. Send checks or company orders to **DIESEL ENGINE CATALOG,** 816 N. LaCienega Blvd., Los Angeles 46, Calif.





ROOSA MASTER

Most Versatile

FUEL INJECTION PUMP

Diesel engine manufacturers, their designers and engineers are specifying ROOSA MASTER because they know that it is the most versatile. There are many reasons for selecting this pump. Here are just a few:

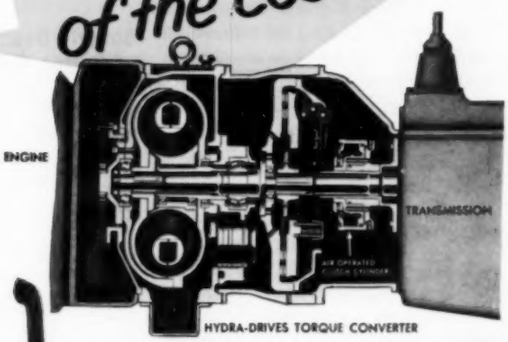
- VERSATILE because of the variety of built-in, space saving, accessories demanded by modern diesel engine design. Roosa Master can provide more compact, lower cost, complete units to meet many different applications.
- VERSATILE because only one size pump serves either a 2, 3, 4, 6, or 8 cylinder, 2 or 4 cycle, small or large displacement engine . . and only Roosa Master can be mounted vertically or horizontally.
- VERSATILE because it is applicable to automotive, construction, farm, generator, marine and stationary equipment guaranteeing dependable, economical service. Write for further information.

HMS ROOSA MASTER makes good diesels better

HARTFORD MACHINE SCREW CO., HARTFORD, CONN.

DIVISION OF STANDARD SCREW COMPANY

Now! Many Of The Advantages Of Power Shift Transmission *at a fraction of the cost!*



HYDRA-DRIVES®

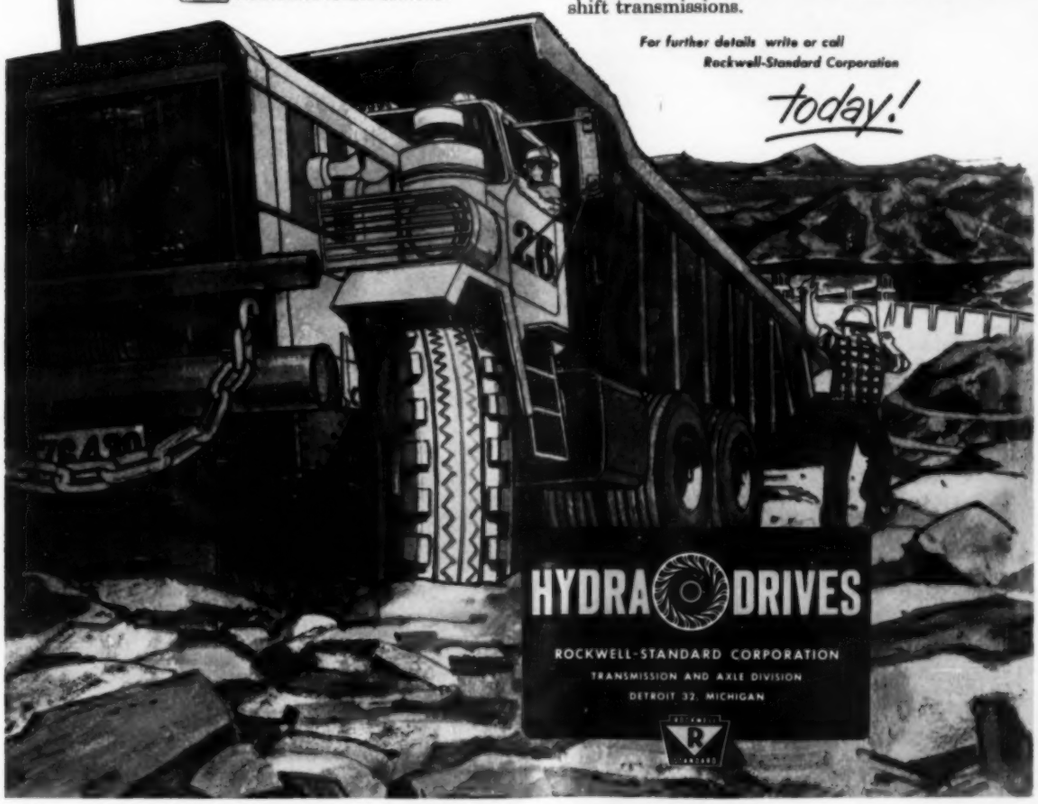
TORQUE CONVERTER WITH A STICK SHIFT TRANSMISSION!

Lower in initial costs, Rockwell-Standard's Hydra-Drives Converter with stick shift transmission reduces operating and maintenance costs on heavy-duty off-highway trucks. You get these five major advantages plus many others:

1. Up to 80% of shifting is eliminated. Select a transmission ratio to fit the haul, and let the converter handle the changing load conditions with a minimum of gearing. Any required shifting can be done while truck is in motion!
2. Greatly reduces shock loading on all drive components.
3. Clutch adjustments and wear problems minimized.
4. A minimum of driver training is required.
5. Cost is hundreds of dollars less than full power shift transmissions.

For further details write or call Rockwell-Standard Corporation

today!



ANOTHER PRODUCT OF **ROCKWELL-STANDARD** CORPORATION

Purolator Installs Computer

An electronic computer system able to process customer orders in seconds, even while computing federal and state taxes, has been installed in the Rahway (N. J.) headquarters of Purolator Products, Inc. An IBM 305 Ramac processes complete "memorized" order data for more than 4,000 different types of industrial and automotive filters, updates the inventory for each filter unit and readies all necessary shipping information, including the number of units to be packed per carton and the type of freight service to be used. The new system will save customers about five days on delivery time and provide close control over accounting, inventory and production, said Mr. James D. Abeles, Purolator's president. Complete order information is available in seconds. Future data can be added or deleted from the 5 million character "memory" of the computer, which can read, type, add, subtract and "make decisions" electronically for any number of requests fed into the system. The system also sequences its operations in logical order. If the particular filter order being processed should deplete stock on hand, the system's memory center signals this depletion, stores the order, and, when stock is available, processes the orders withheld in sequence according to the date each order was received and withheld. During processing, the system automatically types original invoice, customer and file copies, bill of lading, packing list and shipping instructions. The packing list contains all information required by production and warehouse personnel to fill the order.

Supercharger Intercooler and MONO-WELD® Engine Jacket Water Cooler by Young photographed prior to shipping to Venezuela.

Young Radiator Company

provides the cooling system

MASSIVE TRAILER-MOUNTED MOBILE GENERATING PLANT IS BUILT FOR SOUTH AMERICA . . .

Designed by Young engineers, built by Young Radiator Company, the cooling system for this gigantic unit is now playing its part in a major construction project in Venezuela.

Top quality design and construction of the world's largest trailer-mounted, mobile 1250 kw diesel generating plant—developed and built by the White Diesel Engine Division of the White Motor Company, Springfield, Ohio, demanded a cooling system of equal quality and reliability. Young Radiator Company, with their unmatched years of experience, provided the answer.

A Young Special Model 600 Engine Jacket Water Cooler and Young Supercharger Intercooler cools the White Superior 1765 hp Diesel Engine. The cooling equipment by Young is built to last the lifetime of the power plant which may be used in the future to supply the electric needs of a new Venezuelan town of 10,000 people.

At home and overseas Young quality and experience have made the name "Young" synonymous with the best in design and construction. If you have a heating or cooling problem do not hesitate to consult us. There is no obligation.

Write today to Dept. 409-L for catalogs No. 1652 and 557.

Young RADIATOR COMPANY

RACINE, WISCONSIN

Creative HEAT TRANSFER ENGINEERS

Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Mattoon, Illinois

Euclid Boosts Horsepower to 563 in TS-24 Scraper

Current production units of the model TS-24 Euclid scraper are powered by two GM Diesel engines providing a total of 563 hp, representing an increase of 45 hp over the former model. The tractor axle is powered by a 336 hp engine and a 227 hp diesel is mounted at the rear to drive the scraper wheels. Each of these engines has a separate Torqmatic drive consisting of torque converter and semi-automatic transmission. This all-wheel drive arrangement enables the operator to use either or both drive axles as job conditions require. The TS-24 has a struck capacity of 24 cu. yds.—rated payload at 1:1 slope is 32 cu. yds.

American Marc Acquires Two Boat Companies

Acquisition of the assets of Rocket Marine, Inc., El Monte (Calif.) fiberglass boat producer, by American Marc, Inc., Inglewood, Calif., has been announced by Mr. W. Denis Kendall, president of American Marc. American Marc manufactures lightweight diesel engines, diesel generator sets and generators. With the acquisition, American Marc becomes one of the nation's first companies to market a full line of pleasure boats powered by diesel engines. Construction has begun on a new 24,000 sq. ft. marine division factory, to be built on a 10 acre site in North Redondo Beach, Calif. Amercan Marc in July purchased Cregar Marine, Seal Beach (Calif.) manufacturer of wood boats.

American Marc purchased Rocket Marine's inventory and production facilities. The Rocket Marine building itself is under lease to American Marc. American Marc is now in production of a complete line of wood and fiberglass boats in outboard and inboard models. The wood boat line includes: power boats from 14 ft. runabouts to 27 ft. cabin cruisers; and 18, 24 and 30 ft. sailboats. Fiberglass boats include a 19 ft. cabin cruiser (available in either inboard or outboard models), two 17 ft. diesel inboards and a 14 ft. and 15 ft. runabout. The company is establishing a national sales and distribution organization for its boating line.

Under terms of the acquisition of Cregar Marine, Mr. F. M. Cregar, president of the firm, will become an American Marc vice president in charge of the marine division.

Bulletin Describes Line of Dodge Couplings

An expanded line of Dodge Para-flex flexible cushion couplings ranging from fractional to 190 hp per 100 rpm is described in a new 12-page bulletin. Two new sizes have been added to the 10 previously offered to increase the scope of industrial applications for which the coupling can be used. New PX24, largest in the line, is capable of delivering up to 2000 hp at 1080 rpm. This is 2½ times the maximum horsepower of the largest Para-flex previously offered. Photographs, drawings and text explain design features and operating characteristics of Para-flex. The rubber-tire coupling accommodates angular misalignment, parallel misalignment and end float—singly or in any combination. It also cushions shock loads and diminishes torsional vibration. No lubrication is required; the flexible element may be changed when necessary without removing flanges from shafts. Ask for bulletin A669C, Dodge Mfg. Corp., Mishawaka, Ind.

Dravo Promotes Booth

Mr. Donald A. Booth has been appointed engineering manager for Engineering Works Division of Dravo Corp., Pittsburgh, Pa. He had been assistant engineering manager for the last year. His duties will include supervising the design and engineering of towboats and barges. Booth joined Dravo as an engineer in 1935, shortly after his graduation from Cornell University. His experience with Dravo has included field engineering, costs, plant and industrial engineering and a number of supervisory positions.

Parker Introduces New Push Type Hose Fitting

A new line of fittings and industrial hose for air, water, oil and fuel service at pressures under 250 psi has been announced by Parker Fittings & Hose Di-

vision, Parker-Hannifin Corp. The fittings have been given the trade name of "Push-lok" as a derivation from the assembly instructions: "just push the hose on". Two types of hose are available for use with the Push-lok fittings. No. 821 hose has fiber braid reinforcement and cotton braid cover. No. 831 hose has fiber braid reinforcement and abrasion-resistant rubber cover. Five sizes are offered from ¼ in. through ¾ in. i.d. Temperature range is from minus 65°F. to plus 250°F., except for air, which is 160° maximum.

Fittings with seven different connecting ends are offered: male pipe thread; Triple-lok end to connect 37-degree flared tube; 45-degree cone to connect 45-degree flared tube; swivel nut to mate with Triple-lok 37-degree cone; swivel nut to mate with 45-degree cone; inverted 45-degree flare seat; and inverted swivel nut to mate with inverted 45-degree flare fitting. Fittings are brass except for swivel nuts, which are steel. Each fitting has a plastic cap to fit over the end of the hose for neater appearance and to help prevent possibility of capillary action of fluids in the reinforcement braid of the hose.

The fitting will not pull out of the hose. The hose is pushed on, over barbs on the stem of the fitting. The hose is expanded over the barbs, causing it to contract within the depressions to grip the stem firmly. A sharp knife is used to remove the fitting. Details are given in Push-lok catalog No. 4482, available from W. O. Murray, Parker Fittings & Hose Division, Parker-Hannifin Corp., 17325 Euclid Avenue, Cleveland 12, Ohio.

Techniques for Diesel Operation Down to –65°

Diesel engines can be started and operated at temperatures down to minus 65° F. if correct fuels and lubricants, adequate heating and sufficient cranking speeds are used, according to an Army report released to industry through the Office of Technical Services, United States Department of Commerce. The study outlines the existing problems and the effectiveness of applied remedies associated with the operation of diesel engines at low temperatures. The information is based on both a survey of research papers and on extensive Army experience.

Heat directed to the engine manifold, cylinder walls, combustion chamber, crankshaft bearing and other strategic areas where cold lubricants offer resistance to cranking is recommended for best results. Various heating methods, including the use of heat-retaining unit enclosures, are described and discussed. Among other conclusions, it was found that an additive such as diethyl ether is required to promote diesel fuel ignition. Research pertaining to the field of priming aids and devices is summarized. Another important factor considered is the know-how of experienced operators.

A review of research toward high-speed cranking systems which may reduce or eliminate the need for heating devices is presented. Results of such research may also be applicable to internal combustion engines. The report, PB 151676 *Starting of Diesel Engines at Low Temperatures*, J. A. Klisch, Engineer Research and Development Laboratories, U.S. Army, July 1958, may be ordered from OTS, U.S. Department of Commerce, Washington 25, D. C. It contains 43 pages, price $1.25.

Article on 251 Engine Appears in *Alco Review*

Articles on nuclear-component manufacture and results of four-years' operation of the Alco 251 diesel engine lead the Spring-Summer issue of the *Alco Review*, a 28-page publication of Alco Products, Inc. The article on the 251 engine traces its development as a lightweight, heavy-duty prime mover, and discusses its experiences in locomotive, stationary and marine applications. Copies of the *Alco Review* are available by writing Alco Products, Inc., Box 1065, Schenectady 1, ,N.Y.

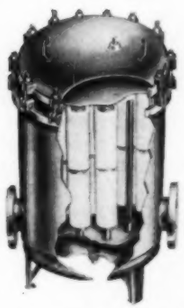
Allis-Chalmers Appoints Hedden as Works Manager

Mr. Russell A. Hedden has been appointed works manager of manufacturing, Industries Group, at Allis-Chalmers Mfg. Company's West Allis (Wis.) Works. He succeeds Mr. E. W. Bonness, who has been named consultant to the director of manufacturing, Industries Group. Hedden had been works manager of the company's York (Pa.) Works since 1957. He joined the S. Morgan Smith Co. (now the York Works) in 1951 as comptroller. He is a graduate of the Newark College of Engineering.

Cummins International Promotes Three Men

Promotion of three persons has been announced by Mr. W. A. Reeks, managing director of Cummins Diesel International Ltd. Mr. C. B. White, formerly regional manager–special accounts in Washington, D. C., has been appointed regional manager for the Middle East region with headquarters in Calcutta, India. He is succeeded in Washington by Mr. T. O. Clare, who had been stationed at the Cummins factory, Columbus, Ind., in a supervisory capacity. Mr. G. C. Scott has been named manager of parts sales for Cummins Diesel International Ltd. and will be headquartered in Nassau, The Bahamas.

HERE'S WHY *Fulflo* FILTERS REDUCE ENGINE WEAR



Only Fulflo Filters have genuine Honeycomb Filter Tubes, engineered to provide true *depth* filtration — even down to 1 micron! They provide substantial savings by reducing the amount of sludge content and helping to prevent wear on cylinders and bearings.

Every drop of lube oil is filtered again and again through hundreds of filtering films. Contaminants are trapped in inner storage cells, preventing surface blinding and giving unequalled tube life.

Fulflo Filters are designed for both diesel fuel and lube oil. They are available in a variety of sizes employing from 1 to 270 Honeycomb Filter Tubes for flow rates up to 1350 gpm or higher.

Write for literature to Department DS

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

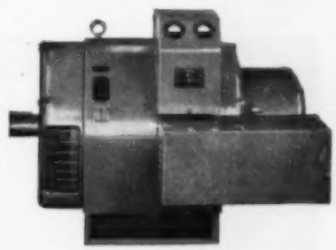
If you hate maintenance, you'll like **E-M's** *new*

BRUSHLESS

"Packaged" Generator

BEMAC

(Brushless Excited Magnetic Amplifier Controlled)



BEMAC is available in ratings of 10 thru 150 kw, 3 phase; 10 thru 100 kw, 1 phase; 1200 and 1800 rpm; 0.8 PF; 60 cycles; broad-range voltages of: 120/208-139/240 and 240/416-277/480 volts, 3 phase; 120/240 volts, 1 phase.

NO COMMUTATOR!
NO SLIP RINGS!
NO BRUSHES!

Here is a generator that is *practically maintenance-free.* It requires no servicing other than an occasional bearing check. Efficient, reliable, ageless silicon diodes rectify the exciter a.c. to d.c., eliminating the need for commutators, brushes, and slip rings. There are many advantages:

Better suited to dusty, corrosive atmospheres. No electrical parts subject to wear and damage from dust and dirt.

Safer in hazardous atmospheres. No moving electrical contacts. Sparking is eliminated.

Easier to operate. No complicated adjustments—anyone can operate BEMAC.

Magnetic amplifier regulated. Voltage regulation is automatic. A unique static voltage sensing circuit gives ±2% regulation.

"Rock-Steady" voltage makes your motors, lights, and electronic equipment work better.

Starts big motors. Built-in voltage boost transformer makes big motor starting easier.

Simple to install. BEMAC is self-contained, completely factory assembled.

● *Publication 255 tells how BEMAC Generators work. Write for a free copy and call your E-M Field Engineer.*

ELECTRIC MACHINERY MFG. COMPANY
Minneapolis 13, Minnesota

The Originators of "Packaged" Generators

Southwest Diesel Notes

By **Donald M. Taylor**

HERE'S the engine lineup for a $21 million compressor station expansion program. Transcontinental Gas Pipe Line Corp. will add 60,280 hp to its Texas to New York pipe line system. Included in the expansion are four brand new stations as follows:

STATION No. 26 located near Greenberg, La., will start operations early next year with three Cooper-Bessemer LSV-16's. Total horsepower: 13,200. H. B. Zachary Co. started construction of the new station in October.

STATION No. 35 is being constructed near Lexington, N. C. Two Nordberg FSE 1316's will supply a total of 7640 hp. Contractor is Gasoline Plant Construction Corp.

STATION No. 37 is being constructed near Scottsville, Va. Work started in September. This Transco station will have two Cooper-Bessemer LSV-16's with a total of 8800 hp. Fish Engineering Corp., Houston, Tex., is the contractor.

STATION No. 39 near Delta, Pa., will have two Nordberg FSE 1316's. Western Pipe Line, Inc., Austin, Tex., started construction in September.

TRANSCONTINENTAL Gas is adding compressor horsepower to 10 of its existing stations. Here is the engine lineup:

STATION No. 6 near St. Francisville, La., will soon have an additional 2500 hp. The addition—one Cooper-Bessemer GMW A-10. Fish Engineering Corp. of Houston started work this summer.

STATION No. 8 near Sandersville, Miss., is obtaining 2500 hp additional. Nichols Construction Co. started work last summer, adding one Cooper-Bessemer GMW A-10.

STATION No. 13 near Comer, Ga., will get one new Clark TLA-6. Fish Engineering Corp. started work in October. Horsepower: 2000.

STATION No. 51 near Eunice, La., will also get an addition of 2000 hp. Dresser Engineering started work in August for the Clark TLA-6.

STATION No. 12 near Stockbridge, Ga., will have a new 2500 hp Cooper-Bessemer GMW A-10 soon. A. R. Salley & Co. started work on this addition in August.

STATION No. 9 near Linden, Ala., will also have a 2500 hp addition when Fish Engineering Corp. of Houston completes the addition of a Cooper-Bessemer GMW A-10. Work started in Sept.

STATION No. 14 near Moore, S.C., will be increased by 2500 hp when one Cooper-Bessemer GMW A-10 is added to the present engine lineup. Gasoline Plant Construction Corp. started work in August.

STATION No. 16 near Reidsville, N. C., is getting a new Clark TLA-6. Gasoline Plant Construction Corp. started work on the 2000 hp addition in August.

STATION No. 17 near historic Appomattox, Va., will have 2500 hp extra when Gasoline Construction Corp. completes construction started in September. The addition: one Cooper-Bessemer GMW A-10.

STATION No. 18 near Orange, Va., will be increased by one 2000 hp Clark TLA-6. Gasoline Plant Construction Corp. started work in September.

SUMMARIZED, Transco will add five Cooper-Bessemer LSV-16's and six GMW A-10's; four Nordberg FSE 1316's; and four Clark TLA-6's.

GIN'S 'a ginning! Kott Bros. Gin, Rt. 1, Jarrell, Tex., purchased a new power unit for fall cotton ginning from Stewart & Stevenson Services, Inc. The new engine is a series 63, 4 cylinder GM Diesel.

FRACTURING company—The Oklahoma Fracturing Co., Inc., Cushing, Okla., bought a large sand-frac unit from Stewart & Stevenson Services, Inc., Houston. This unit—powered by two series 71 GM Diesel V-12's (about 600 hp)—is used to fracture oil producing rock thousands of feet below the surface of the ground. The cracks formed by high-pressure oil or water are propped open by sand, so more oil can reach the bore hole of the well.

American Marc Names Three New Distributors

Appointment of three new eastern distributors has been announced by American Marc Inc. They are: Allied Diesel Sales & Service, Inc., 332 Congress St., Boston, Mass.; Harbor Supply Oil Co., Inc. 42 Portland Pier, Portland, Me.; Scranton Tractor and Equipment Co., 413-421 Walnut St., Scranton, Pa. The distributors will handle sales and service of the full line of American Marc small, lightweight diesel engines and diesel generator sets.

Solar Aircraft Builds At California Site

Solar Aircraft Co. recently signed a contract with Diversified Builders, Inc., Paramount, Calif., to erect a new 62,000 sq. ft. engineering and research building on Solar's San Diego (Calif.) bayfront plant site. Mr. Herbert Kunzel, president of Solar, said that the company planned to occupy the new building by May 1, 1960. The building and equipment will represent an investment of more than $1 million, he said, adding that the structure is required by Solar's expanding engineering and research staffs in such fields as gas turbine engines, missile and spacecraft and industrial products.

SAFE
DEPENDABLE GENERATOR OPERATION
Spark Free!
EXPLOSION RESISTANT
KATO
Adaptable To Any Industrial Engine!
Kato's complete line of 50, 60 and 400 cycle revolving field AC Generators is now available in brushless design.
Especially desirable for operation in gaseous environments.
GREATLY REDUCED MAINTENANCE!
KATO BRUSHLESS AC GENERATORS
60 CYCLE SIZES
3 Phase: 5 to 400 KW
1 Phase: 5 to 150 KW
SPEEDS
720, 900, 1200, 1800 RPM.
Take your choice throughout the Kato Line—Brushless or standard slip ring types. For all your 400 cycle or power converting needs investigate Kato's complete line of high frequency alternators and motor generator sets. Complete control systems for all Kato products include Kato magnetic amplifier voltage regulators, static exciters and motor starters for synchronous or induction motors.
BUILDERS OF FINE ROTATING ELECTRICAL MACHINERY SINCE 1928
NEW BRUSHLESS GENERATOR CATALOG
Write For It Today!
KATO
ENGINEERING COMPANY
1443 FIRST AVENUE, MANKATO, MINNESOTA—PHONE 8-2941

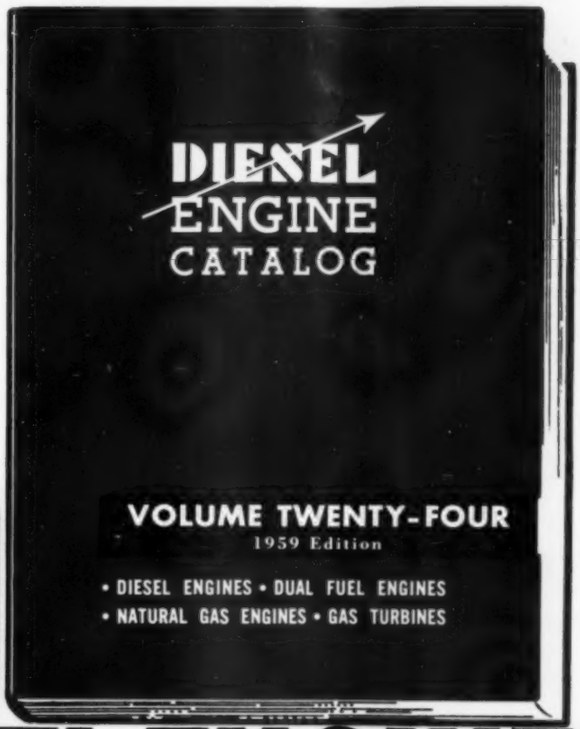
KEEP YOUR ENGINES RUNNING CLEAN AND LONGER
HILCO
WITH FULL FLOW AND BY-PASS FILTERS FOR ENGINE LUBE AND FUEL OIL
Clean Oil – Clean Engines
WRITE FOR FREE LITERATURE
THE HILLIARD CORP., 122 W. FOURTH ST., ELMIRA, N. Y.
IN CANADA—UPTON-BRADEEN-JAMES, LTD.—890 YONGE ST., TORONTO—8760 VERVILLE ST., MONTREAL

NEW AND NOW AVAILABLE! The completely new 1959 edition of the **DIESEL ENGINE CATALOG,** Volume 24 can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½" x 13½", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs $10 postpaid anywhere in the world. Send checks or company orders to **DIESEL ENGINE CATALOG,** 816 N. LaCienega Blvd., Los Angeles 46, Calif.

AVAILABLE NOW

If you design, purchase, sell, operate or service diesel, dual fuel, natural gas engines or gas turbines — **Here is important information for you!**

New complete information on engines & accessories!



1959 DIESEL ENGINE CATALOG

LOOK AT THE CONTENTS!

1. ENGINES — All major manufacturers of diesel, dual fuel, natural gas engines and gas turbines are represented in multiple page sections. Text is supplemented with specifications, power curves, photographs and sectional views.

2. TURBOCHARGERS and SUPERCHARGERS — This section of manufacturers is detailed and fully illustrated to give complete information on this increasingly important phase of the industry.

3. TRANSMISSIONS — The latest information on torque converters, fluid drives, and other modern means of transmitting power are fully described and illustrated in this section.

4. ACCESSORY EQUIPMENT — Recent developments in fuel injection systems, governors, and other key accessory units are detailed and illustrated fully in this section.

5. MARKET PLACE — A convenient, time-saving listing of sources from which you can obtain the multitude of items and services needed by the fast growing Diesel Industry.

6. ADVERTISING — Leading manufacturers of engines, accessories, and services bring out the important features of their products in attractive, easy to read advertisements to further enhance the reference value of the CATALOG.

Still only $10. per copy!
Postpaid

Ready to mail! Order yours today!

ORDER BLANK

NAME POSITION

COMPANY

BUSINESS CLASSIFICATION

ADDRESS

CITY ZONE STATE

(Fig. 288)

Viking Pumps

Capacities from 17 to 164 G.P.M.

You have four pump sizes and a wide range of speeds available, with these new Viking heavy duty pumps . . . because of the five easily interchanged helical gear reductions. By changing gear reductions, you can handle liquids ranging in viscosity from Bunker C to fuel oil.

These new reduction units also make pumps narrower and lower . . . able to fit into smaller space. Gears run in oil. Reducing units are mounted separately — not supported on pumps or motor shafts.

For full information on these new, compact reducing units, write today for Catalog CD, Pages 27-28

VIKING PUMP COMPANY
Cedar Falls, Iowa, U.S.A. In Canada, it's "ROTO-KING" pumps

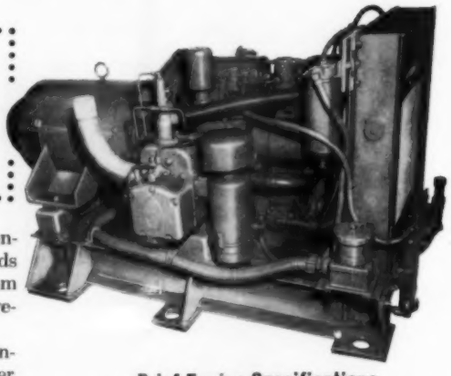
See Our Catalog in Sweet's Industrial Construction and Plant Engineer's File

The WITTE 100 RDA Diesel Engine-Generator Unit

is designed specifically for railway mechanical refrigeration.

The 100RDA Provides These Advantages:

1. SHOCKPROOF 2. DEPENDABLE 3. LOW FIRST COST 4. MINIMUM MAINTENANCE ATTENTION 5. LARGE ENGINE PERFORMANCE with small engine economy.



HERE IS a compact, powerful diesel engine-generator unit that is setting performance records in maintaining temperature ranges varying from −10°F. to 70°F. in 40′ and 50′ mechanically refrigerated railway cars.

Its low profile (33″) makes the Witte 100 Engine, which powers this unit, outstanding in either stationary or mobile applications. The horizontally-opposed cylinders provide inherent balance to make it smooth in operation and stable in performance. It has proved its DEPENDABILITY in the demanding railway field, where LOW FIRST COST yet exclusively-engineered railway features are necessary. MINIMUM MAINTENANCE ATTENTION is required with . . . 1200 hours between oil and filter changes . . . auxiliary fuel oil system, with day tank . . . brushless 12½ KW generator. It gives LARGE ENGINE PERFORMANCE with small engine economy.

USS and Witte are registered trademarks

Brief Engine Specifications

Bore and Stroke	4″ x 4″
Cycle	4
Displacement	Cu. in. 100
Speed	rpm 1800
Horsepower: Continuous	18
Maximum (Bare Engine)	23.7
Height	inches 33
Width	inches 40½
Length (Approximately)	inches 66

Witte Engine Works
Oil Well Supply Division of
United States Steel

1615 Oakland Avenue, Kansas City 26, Missouri

Alco Appoints Manager of Engineering Development

Hans Schwarz

Alco Products, Inc., has appointed Mr. Hans Schwarz as manager of general engineering and development in the research and development department. Schwarz, a senior project engineer for Alco since 1955, will continue to make his headquarters at the company's research and development center in Schenectady, N.Y. In his new position, Schwarz will evaluate and manage programs undertaken by the research and development department. A native of Halle, Germany, Schwarz holds a mechanical engineering degree from New York University. Prior to joining Alco in 1950 he was associated with the Elliott Co. in Jeannette, Pa.

175 Attend Woodward's 23rd Control Conference

More than 175 visitors, representing over 80 domestic and foreign companies, attended Woodward Governor Company's 23rd prime mover control conference Sept. 8-11 at the Woodward plant in Rockford, Ill. The conference was open to all foreign and domestic industries which use hydraulic governors in their operations, and also to branches of the United States and foreign governments.

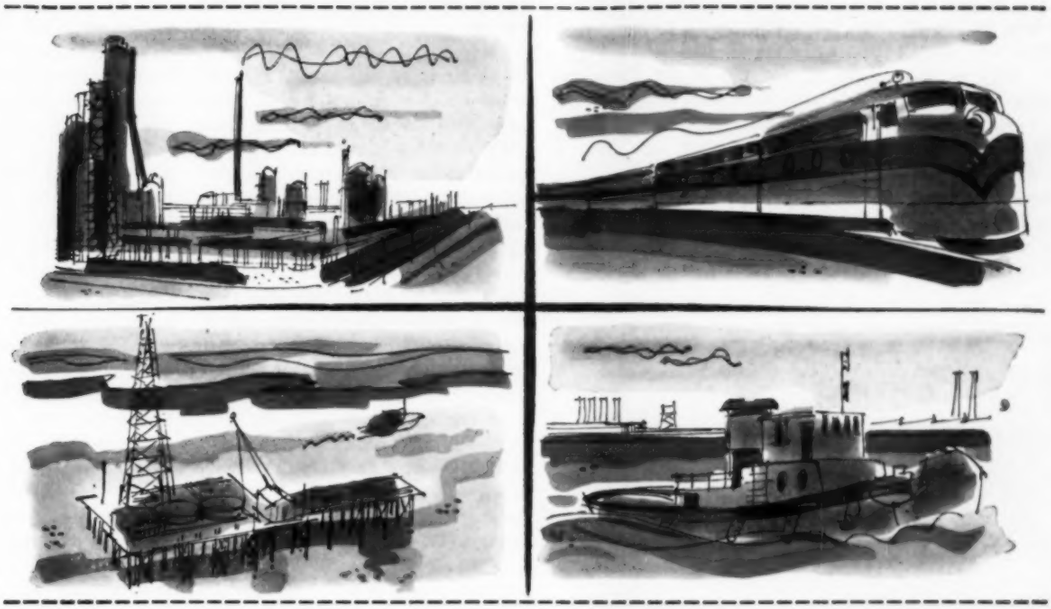
Separate instruction programs covered the operation and maintenance of Woodward speed controls in four major divisions. Many important industries were represented in the sessions covering

Checking features of a diesel governor are (from left): Don Carncross, Woodward service department manager; John Semanchick, Worthington Corp., Buffalo, N. Y.; Harlan Holmes, Allis-Chalmers Mfg. Co., Harvey, Ill.; and Marvin Rosaa, Caterpillar Tractor Co., Peoria, Ill.

governors for internal combustion engines. Conferees studied automatic fuel controls for gas turbine engines and were schooled in the maze of flyweights, valves, circuits, servo mechanisms, load sensing devices and other elements.

NEW AND NOW AVAILABLE! The completely new 1959 edition of the **DIESEL ENGINE CATALOG,** Volume 24 can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10½″ x 13½″, fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs $10 postpaid anywhere in the world. Send checks or company orders to **DIESEL ENGINE CATALOG,** 816 N. La Cienega Blvd., Los Angeles 46, Calif.

FOR THE LONG RUN . . .



it's KOPPERS Piston Rings

Where profit depends on keeping equipment in service, engineers recognize the importance of ring performance. That is why Koppers Piston Rings go into the finest engines in the world . . . why they are selected for replacement when better performance is demanded.

Since the first diesel engine, Koppers has produced piston rings of predictable performance in a complete range of materials and a wide selection of types and sizes. If you have a ring problem, Koppers can offer you the benefit of their experience. Write to: KOPPERS COMPANY, INC., Piston and Sealing Ring Department, 4211 Hamburg Street, Baltimore 3, Maryland.

Send now for Koppers recommended Piston Ring Set-Ups applicable to the engines which you operate.

KOPPERS

PISTON AND SEALING RINGS

Engineered Products Sold with *Service*

Florida Diesel News

By Ed Dennis

COLORFUL ceremony was held in September when the 44 ft. Greek sponge fishing vessel, *Little Deno* of Tarpon Springs, was repowered with a model HR-6-M Cummins diesel engine, 175 hp at 1800 rpm, and Twin Disc 3:1 r&r gears. After the blessing of the vessel by a Greek archbishop, the trial runs were held and food and refreshments served to all invited guests. Manuel Angelis is the skipper; Angelo Angelis installed the engine, which came from the Tampa branch of Cummins Diesel Sales Corp.

WORKING on the Fort Lauderdale Tunnel is a Lincoln arc welder powered by a Continental model GD-157 diesel engine. Also included on this engine is a Roosa Master fuel oil system and Fram lube oil filter. The engine is rated 39 hp at 2000 rpm.

TWO model LRDBSU Waukesha diesel engines to power 12 in. discharge hipressure Byron-Jackson fire pumps for the city of Miami. These 12 cylinder 8½ x 8½ diesels are rated 1097 hp at 1200 rpm. They came from Simplex Sales of Miami.

FOR Mount Sinai Hospital, Miami Beach, two 175 Delco generating sets powered by GM Diesel 6-110's, and a 35 kw Delco generator unit with a 3 cylinder series 71 GM Diesel.

DELIVERED to Calderone Enterprises, San Juan, Puerto Rico, the newly launched 64½ ft. steel cargo vessel *Isabel II*, for use in the Caribbean freight trade. Propulsion is two GM diesel 6-110 engines, each rated 210 hp, plus a 10 kw 110/220 volt General Motors ac generating set.

SHELLEY Tractor & Equipment Co., Miami, engineered the installation of the Caterpillar dieselized generating sets at the Coral Harbour Club power plant in New Providence Island in the Bahamas. Two Caterpillar D397 series D 315 kw Columbia 54.5 amp, 4160 volt generators and one D342 Cat set with a 100 kw, 17.3 amp, 4160 volt Columbia generator.

TAMPA Ship Repair & Drydock Co. has been appointed marine dealer for the Florida west coast by the Cummins Diesel Sales Corp. Located at Hookers Point, the firm will offer sales and service for fishing and work vessels along the coast.

NEAR Highland City, the Wilson Construction Co. is using a fleet of Caterpillar dieselized units, including three DW21 (300 hp) tractors and 25 cu. yd. scrapers, while D9 (320 hp), D8 (191 hp) and D7 (128 hp) tractors are being used for push loading, clearing and grubbing in rebuilding Highway 98.

TWO model LDM2 Lister diesel engines with Lister 2:1 r&r gears were installed in the 46 ft. catamaran, *St. Petersburg*, by Alvin Krech of Pass a Grille Beach. The engines came from Gulf Coast Engines Sales, Inc., Tampa.

SUPERIOR Asphalt Co. took delivery of a T500 Galion motor grader powered with a 6 cylinder, 125 hp Cummins diesel engine and Grade O Matic drive. Also delivered was a 25 Northwest ¾ yd. dragline with a No. 12 Murphy diesel engine; from Florida-Georgia Tractor Co., Miami.

PORT CHARLOTTE: the Mackle Co. has four 5D190 Huber-Warco road graders for street construction work. These are powered with GM Diesel 6-71 engines, each rated 165 hp, and have Allison torque converters.

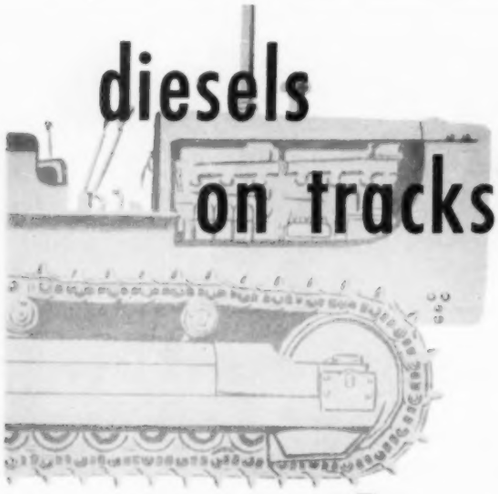
SOLD by Peninsular Equipment Co., Wauchula, to R. H. Davis for use as prime power for a rock crusher, a 4 cylinder model X Ford diesel developing a max. 68 bhp and a Rockford power take-off, while Lee Motors of Fort Myers delivered a similar make for a similar job just outside Fort Myers. These units use the Simms fuel injection system.

FORT MYERS BEACH: Maddox Construction of Punta Gorda is using a couple of model DM2 Le Tourneau-Westinghouse Tournapull scrapers powered by 138 hp GM Diesel 4-71 engines. The firm also has a Tournatractor with a GM Diesel 210 hp series 71 engine to push load in the soft sand.

THE Nassau Beach Lodge, in the Bahamas, purchased a Mercedes-Benz 319 bus powered by a Mercedes Benz 0319D diesel engine, rated 46 hp at 3500 rpm, and a Mercedes Benz 321D bus with a model OM321, rated 120 hp at 3000 rpm, for use by its guests and employees.

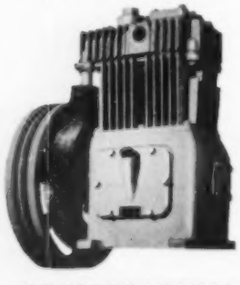
FOR standby use at the Florida City

diesels on tracks?



another spot for *Quincy* compressors

A positively sealed, dust-proof crankcase is just one reason why Quincy Compressors take to this assignment. They're rugged all the way through — with an improved pressure lubrication system that signals the operator if oil is low! Service from coast to coast — complete selection from 1 to 90 C.F.M.



WRITE FOR CATALOG TODAY

Quincy COMPRESSORS

QUINCY COMPRESSOR CO. • DEPT. DP-1159, QUINCY, ILL.

LOW-COST DIESEL GENERATOR CONTROLS

Simple . . . Rugged . . . Reliable

50-60 cycle single and 3-phase with many optional features!

Lake Shore provides the output range you need with superior enclosure . . . standard, easily replaced components and coded harness with all leads pigtailed. Compactly designed for easy cable connection.

Manufacturers of Trans-O-Matic Motor Driven Transfer Switches • Solenoid Operated Breakers • Autostatic Voltage Regulators • Adjustable Differential Voltage Relays.

THE Lake Shore ELECTRIC CORPORATION
205 Willis Street Bedford, Ohio

water plant for the Florida Keys Aqueduct, six Worthington diesel engines. Each generating set is rated 150 bhp at 500 rpm, with Westinghouse ac 125 kva, 480 volt generators and Woodward UG8 governors.

SIESTA Isle Land Development: Three Allis-Chalmers dieselized pieces of equipment are in use—one a No. 45 motor grader with 120 hp diesel, one HD-16 crawler tractor, 150 hp with hydraulic torque converter, and an HD-6-G tractor shovel, 72 net rated hp.

FORT Lauderdale: the Thorington Construction Co. is using two Fairbanks-Morse two stage vertical lift, 6000 gpm at 52 ft. head, water pumps powered by a pair of Fairbanks-Morse 49B4½, 6 cylinder diesel engines, rated 180 hp at 1800 rpm, for dewatering on a tunnel job.

FROM Florida-Georgia Tractor Co., a TD-24 crawler tractor with a 200 net hp International diesel engine, to Coronet Phosphate Co. to remove overburden from phosphate deposits; also similar models to Cone Bros. Contractors of Tampa and Powell Bros. of Fort Lauderdale.

SIMPLEX Sales of Miami supplied the two model 135-DKB Waukesha diesel engines for the repowered 46 ft. charter fishing craft *Vero II*, fishing out of Hillsboro Inlet, Pompano Beach. They are rated 151 hp at 2000 rpm. Also included were Capital 2:1 hydraulic r&r gears. The new speed is 18 mph.

Cat Issues Filter Booklet

Answers to such questions as "What does filtering really cost me?" are provided in an 8-page booklet entitled "Three Questions" recently prepared by Caterpillar Tractor Co. The two other questions asked and answered are "Aren't all elements about the same?" and "Honestly, how often should elements be changed?". Filtering costs, the booklet explains, depend on the quality of the element. Elements should be changed, the book says, when the filter's dirt-holding capacity has been reached. Plugged air-cleaner elements, for example, indicate need for a change by causing excessive engine exhaust smoke and loss of power. Filter elements clogged by dirty fuel are indicated on Cat-built equipment by the fuel pressure gauge, which shows lower pressures as the element fills with dirt. Also important, the book stresses, is knowing exactly how much dirt an element will trap before it no longer will do its job. Copies of the booklet are available from Caterpillar dealers or by writing for form DE928, Caterpillar Tractor Co., Peoria, Ill.

Inland River Reports

By **A. D. Burroughs**

ANN-E, new 37.5 x 12.5 ft. diesel boat, has been delivered by builder Breaux' Bay Craft, Inc., Loreauville, La., to Collins Construction Co. GM Diesel engines will supply power for performance in the Persian Gulf.

THE Fairbanks-Morse-powered *Robert P. Bonnie* is using its 3000 hp to serve new owners, Elk Towing Co. The 119 x 35 ft. towboat, built by Sturgeon Bay Shipbuilding and Dry Dock Co. in 1949, has been a "regular" on the Ohio for American Commercial Barge Lines.

GM Diesel engines, Gardner-Denver air compressors, Briggs lube oil filters, Cuno lube oil strainers start the impressive equipment list for the new *Irene Chotin*. Delivered by Dravo, the 3200 hp towboat joins the Chotin fleet pushing petroleum on the Mississippi River.

THE name *Irene Chotin* has been plying inland rivers since 1941, when the 128.5 x 28 ft. towboat was completed by Nashville Bridge Co. This original has its claim to fame as the first river boat to achieve a regular business trip to Corpus Christi, Texas, in 1949. This same towboat is spotted now working for Sioux City and New Orleans Barge Lines, Houston, with 2000 hp from GM 12-278A engines, as the *Nebraska City*.

ANOTHER old favorite, the *Henry C. Ogram*, is in operation for new owner, George McBride, Louisville, Ky. Purchased from Point Towing Co., W. Va., the 640 hp comes from White Superior engines. The 65 x 22 ft. craft, built in 1942, has functioned for Omaha Barge and Towing Co., and for Ashland Oil and Refining Co.

NANCY JO, a seven-year-old towboat operated by Cairo Fleeting and Terminal Co., has new power with three new GM Diesel 6-71 engines for a boost to 525 hp, up from 330 hp.

WESTERN Engine and Machinery Co. also handled installation for two new GM Diesel 6-71's on the *Husky*, in service for the Cairo Fleeting and Terminal Co., for a total 350 hp.

NEW aluminum pilot boat, destined for double-duty in both river and Gulf waters, has been delivered by Southern Shipbuilders Corp., Slidell, La., to Associated Branch Pilots of New Orleans. Equipment for the 48½ x 13 ft. craft includes two GM Diesel engines (6-110's) rated at 578 hp, plus Western Gear Corp. reverse and reduction gears.

OUT on the water, we saw the *Andrew* ..., a 1956 production from St. Louis Shipbuilding and Steel Co. The 108 x 26 ft. towboat was giving good performance for Cumberland River Sand & Gravel Co., Tenn., with 1400 hp developed from two White Superior engines.

CITY OF HUNTINGTON, another 1956 production from St. Louis Shipbuilding and Steel Co., was out in the coal traffic. The 140 ft. towboat was at work for Ohio River Co., with 2160 hp delivered from the two Baldwin-Lima-Hamilton engines.

THE *Toltec* was on the Ohio, pushing with the 3975 hp supplied by the three Enterprise engines. Owned by Indian River Lines, built by Nashville Bridge Co., this two-year-old craft continues to produce an outstanding work record.

THE lovely *Laura Lee* was using its rated 6000 hp developed from three Fairbanks-Morse OP engines to push 26 barges on the Mississippi River. This powerhouse was completed in 1957 by St. Louis Ship for Upper Mississippi Towing Corp., Minneapolis.

THE Hillman fleet was busy, and we caught a photo of the *Patsy Hillman* in action on the Monongahela River. Completed in 1950, this 115 ft. towboat performs for Hillman Transportation Co., Pittsburgh, with 800 hp from Cooper-Bessemer engines.

CUMMINS power carried the workload for the *Carolyn M*, a busy boat on the lower Mississippi River. Built in 1958 by Mobile Ship Repair, Inc., the 70 x 23 ft. craft operates for Ideal Cement Co., with 810 hp from twin 12-cylinder Cummins engines.

THE *Lucinda Clark* performs with new power for an older boat. Built in 1937, the towboat serves McAlester-Davis Co., Memphis, Tenn., with 1000 hp supplied from two Caterpillar turbocharged engines installed in 1958.

Harbormasters give you rugged Power with Outboard Maneuverability and Economy

Models from 40 to 400 h.p. Gas or Diesel

Harbormaster Outboard Propulsion and Steering gives your craft rugged power plus complete 360° maneuverability and the advantages of low cost installation, operation, and maintenance.

Propeller thrust steering permits you to easily dock or maneuver in crowded quarters, stay headed into the current on sharp river bends or in tide rips, run into locks without losing time, shunt or pick up barges with precision, or reverse with full power.

Harbormasters are easily installed on new or existing craft and are ideal for coastwise service as well as in harbors, lakes, canals, and rivers. The advantages Harbormasters offer in better running speeds, shorter trip times, and greater payloads have been proved in all types of operations.

Typical Harbormaster Applications

Tow "Carpolis"

Ferry "Balfour"

Harbor Boat "Papoose"

Work Barge

Send coupon for complete details.

MURRAY & TREGURTHA, INC.
QUINCY 71, MASSACHUSETTS

MURRAY & TREGURTHA, INC.
6 Hancock St., Quincy 71, Mass.
Please send me New Catalog giving details and showing many photos of Harbormasters in action.
Name.....
Company.....
Address.....
.....

Diesel Specialists Hold Successful Meeting in Chicago

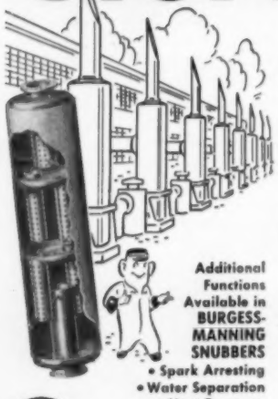
Chicago's Sherman Hotel was the site of the eighth regular meeting of the Association of Diesel Specialists and shown above are most of the 138 men who attended the four-day meeting, Sept. 17-20. In total, 88 separate companies were represented which, combined with an excellent program and manufacturers' exhibits, prompted Association officers to term the meeting, "highly successful."

Presiding at the meeting was ADS President Henry B. Sirotek. In his opening address, Sirotek traced the rapid growth of the Association in its first four years and, in commenting on its purpose in his opening address, stated, "We are pledged to promote and encourage the highest standards of ethics and workmanship for the improvement of the diesel industry and the protection of our customers. To encourage and foster research and development of procedures, equipment and materials, and to provide facilities for the interchange of technical ideas and procedures, with which to better serve the users of fuel injection and related accessories and equipment."

The four-day program, arranged by Chairman John M. Walton, Jr., had many highlights. Perhaps one of the most significant was the panel discussion on Fuel Injection Repair Standards. The panel, moderated by Donald E. Carncross, Woodward Governor Co., included: James N. Britton, Hartford Machine Screw Co.; William J. Finnell, Robert Bosch Co.; Frank DeLuca, American Bosch Co.; Oscar A. Merian, Jr., Scintilla Division, Bendix Aviation Corp.; Anthony A. Brooks, C. A. V.; and A. S. White, Simms Motor Units, Ltd. In the discussion, pump service and testing procedures were outlined, repair problems briefed and the general pattern set down for future activity. Members appeared unanimous in their desire to speed "standardization" and pledged cooperation with Lloyd Bailey, chairman of this committee. One of the key talks of the meeting was on the Federal Excise Tax as it applies to ADS service work. Mr. Harold Halfpenny of Halfpenny, Hahn & Cassidy made the presentation and his firm subsequently has been engaged as counsel for the Association. It was also announced by H. E. "Herb" Wittersheim, chairman of the Service Information Committee, that the ADA Service Manuals were ready for distribution.

The next ADS meeting, called "Operation Mile-High," will be held in Denver, Feb. 18-21, 1960. In addition to Sirotek, other officers of the Association are: M. A. Gerhardt, vice president; S. E. Franklin, secretary; and V. J. D'Aversa, treasurer.

EXHAUST NOISE STOPPED!



Stop nerve-wracking, efficiency-destroying exhaust or intake noise. Your engine can be effectively silenced with Burgess-Manning Snubbers.

Don't tolerate this costly nuisance that leads to problems of impaired employee and neighbor relations, liability claims, losses in efficiency and production mistakes.

Burgess-Manning engineers specialize in the elimination of noise, and of dangerous pulsation-produced vibration in closed gas piping systems. Tell us your problem—we will gladly recommend a solution.

Additional Functions Available in BURGESS-MANNING SNUBBERS
- Spark Arresting
- Water Separation
- Heat Recovery
- Air Cleaning

BURGESS-MANNING COMPANY
Sound Engineering Industrial Silencer Division

START ENGINES EVERY DAY WITH SPRAY...

STARTING FLUID FOR DIESEL & GASOLINE ENGINES

Get more starts, quicker starts, at lower cost with SPRAY STARTING FLUID. Both the fluid and propellent burn . . . there's no waste! Each pressurized can contains enough fluid for many starts . . . starts that will sustain combustion until a smooth running engine can take over. Our greater supply of "vapor pressure" at all temperatures, atomized at a high initial rate, shortens cranking and warm up time, reduces dilution, prevents electrical and starting system wear, saves wasted man hours and equipment down-time. SPRAY is atomized for safe application and quantity control . . . use only as much as the engine requires. Field-proven SPRAY STARTING FLUID will start the toughest engine down to 65° below zero . . . but for year 'round economy start engines every day with SPRAY! Sold through automotive jobbers everywhere.

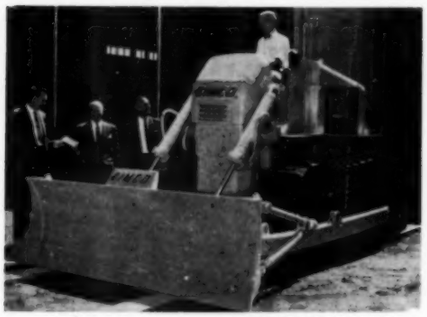
Ask about INSTNSTART closed system starting.

Insist on the can with the "balky donkey" trademark.

SPRAY PRODUCTS CORPORATION
P. O. Box 844 • Camden 1, New Jersey

New Eimco 103 Crawler Rolls off Assembly Line

First production unit of the new Eimco 103 line of crawler tractors was assembled in September at The Eimco Corporation's Tractor Division in Salt Lake City, Utah. It was sold to a customer in Pueblo, Colo. The 103 line of crawlers, recently announced by Eimco, is a 100 hp tractor. Either a Detroit Diesel 4-53 or a Cummins JF-6 diesel engine is available. The 103's have Eimco's unitized "stress flow" construction, whereby steel castings are scientifically molded to the shapes and stress patterns required for maximum strength and rigidity, without welds or bolts. Another feature is Eimco's "quadra-torque" which, teamed with a heavy duty torque converter and "unidrive" transmission, permits four gear selections in either forward or reverse. This allows shifts from any speed . . . or from forward to reverse and back again . . . at any engine or tractor speed and load. The 103 incorporates the Farr RotoPamic self-cleaning air cleaner, which utilized venturi action of the exhaust pipe, to clean itself automatically.



Coming off the production line is the first Eimco 103 series crawler tractor. It is being driven by Development Engineer Ted Hackett. From left are: Wayne L. Dowdey, Eimco district manager; Joseph Rosenblatt, Eimco Corp. president; and Daniel M. Schwartz, vice president—engineering. The new series is available with either Detroit Diesel 4-53 or Cummins JF-6 diesel engine. It incorporates the Farr RotoPamic self-cleaning air cleaner.

A new assembly line is being installed at the Salt Lake City plant for the production of the 103 line. Eimco believes that the market for this unit is greater than for the heavier 105 and 106 units, which alone have fully taxed Eimco's facilities. The 103 line will be produced as a bare tractor, six models of dozers, a front end loader, special steel mill front end loader and a log loader.

Mueller Named Ad Director for the Enterprise Division

J. J. Mueller II

Mr. John J. Mueller II has been appointed director of advertising for the Enterprise Division, General Metals Corp. and Enterprise Engine & Machinery Co., General Metals sales subsidiary. In announcing the appointment, Mr. Arthur W. Ostrander, vice president for sales of General Metals, said that Mueller also would direct the advertising of the Foundry and Forge Division from his office in San Francisco, Calif. Mueller previously had been assistant advertising manager at Enterprise. Prior to that he was Pacific District advertising and sales promotion manager for American-Standard. He also saw service with Hoffman & York, Inc. as an account executive and as a merchandising representative for Haugan-Olson Advertising, Inc. He is a graduate of Marquette University.

Full-Flow Oil Filter

A full-flow oil filter, known as the Winslow CP (Controlled Pressure), has been placed in full production by Winslow Engineering and Mfg. Co., Oakland, Calif. Available in sizes for virtually all diesel engines, Winslow CP Filters have two materials—fine and superfine—in each element. The two filtering materials continuously self-adjust pressure, giving true full-flow of filtered oil without incurring excessive back pressures. (ITS NEW)

DIESEL GARAGE FOR SALE

Cummins Agency available. Readily accessible to New York State Thruway. Priced for quick sale. Write Woodbury Agency, Inc. Highland Mills, New York. Phone WAbash 8-6898.

for all wearing surfaces where **FREQUENT REPLACEMENT** is required

INSIST ON **M-C-M**

chrome plating

Our customers tell us they have never seen a better job of Hard Chroming. We can prove it to you, too!

ULTRA-HARD CHROME

SEE OR CALL US NOW!

M-C-M MACHINE WORKS CO.
901 S. E. 29th P. O. Box 4485
Ph. ME 7-2449 • Oklahoma City, Okla.

A SALEMAKER FOR YOUR MARINE ENGINES

Marine Sales Engineer, 15 years experience in every trade contact from Maine to Florida for Diesel and Gasoline Engines and Propellers to 2000 horsepower. Top sales record to distributors, builders, owners, operators in industrial, commercial, fishing, and pleasure craft. Write Now to Box 500

SAVE MONEY WITH **Interstate**

diesel service incorporated
2093 East 19th St. Cleveland 15, Ohio
America's largest GM fuel injector rebuilder

Exceptional openings for GAS TURBINE SPECIALISTS

* * *

Boeing is one of the nation's leaders in the field of advanced gas turbine engines. Expanding programs in Boeing's Industrial Products Division have created a number of outstanding, long-range openings for experienced gas turbine specialists and qualified project engineers and managers.

Assignments are available in the turbo machinery field of research, design, development, performance analysis, test and applications of gas turbines and components for air, surface and marine use. Requirements are a BSME or higher degree, plus five or more years of applicable experience.

Other outstanding positions are open for engineers with a BSME or higher degree, plus ten or more years of experience in high speed gear box design and familiarity with production methods.

These positions offer unusual opportunities to get ahead rapidly in your field. For full information, write:

Mr. Stanley M. Little
P. O. Box 3822 - DPA
Boeing Airplane Company
Seattle 24, Washington

BOEING

NO LUBRICATION
NO MAINTENANCE
NO WEARING PARTS

Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running.
They will protect your equipment and extend the life of your machines.
Properly installed and operated within rated conditions, Thomas Flexible Couplings should last a lifetime.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES:

- Freedom from Backlash
- Torsional Rigidity
- Free End Float
- Smooth Continuous Drive with Constant Rotational Velocity
- Visual Inspection While in Operation
- Original Balance for Life
- No Lubrication
- No Wearing Parts
- No Maintenance

INDUSTRIAL COUPLINGS
Compressor Drives
Pump Drives

•

DIESEL ENGINE COUPLINGS
Main Drives
Auxiliary Drives

•

MARINE COUPLINGS
Main Drives
Auxiliary Drives

Write for Engineering Catalog

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

ADVERTISERS' INDEX

American MARC, Inc. 57

Bendix Aviation Corp.
Scintilla Division 10

Boeing Airplane Company
Industrial Products Div. 71

Burgess-Manning Company 70

C. A. V., Ltd. 53

Cities Service Oil Co. 4

Commercial Filters Corp. 63

Cooper-Bessemer Corp. ..... Fourth Cover

Cummins Engine Co., Inc. 11

Dana Corporation 8

Delco-Remy Division,
General Motors Corp. 14-15

Detroit Diesel Engine Division
General Motors Corp. 59

Electric Machinery Mfg. Co. 63

Elliott Company 12

Engineering Controls, Inc. 51

Enterprise Engine & Machinery Co. 16-17

Fairbanks, Morse & Co. 55

Fulton Sylphon Division,
Robertshaw-Fulton Controls Co. 58

Garrett Corporation, The
(AiResearch Industrial Div.) 18

General Motors Corp.
Delco-Remy Division 14-15

Detroit Diesel Engine Division 59

Harrison Radiator Division 2

Harrison Radiator Division
General Motors Corp. 2

Hartford Machine Screw Company 60

Hercules Motors Corporation 35-38

Hilliard Corporation, The 64

Interstate Diesel Service, Inc. 71

International Harvester Company 9

Kato Engineering Company 64

Koppers Company, The 67

Lake Shore Electric Corp., The 68

M-C-M Machine Works Co. 71

Murray & Tregurtha, Inc. 69

Nordberg Manufacturing Co. 13

Purolator Products, Inc. 1

Quincy Compressor Company 68

Rockwell-Standard Corporation
Transmission & Axle Div. 61

Robertshaw-Fulton Controls Co.
Fulton Sylphon Div. 58

Schwitzer Corporation 5

Scintilla Division,
Bendix Aviation Corp. 10

Spray Products Corporation 70

Standard Oil Co. of California ..... Third Cover

Standard Oil Co. (Indiana) 6-7

Texaco Inc. ..... Second Cover

Thomas Flexible Coupling Co. 72

Viking Pump Company 66

Winslow Engineering & Mfg. Co. 54

Witte Engine Works, Oil Well Supply
Div. of United States Steel 66

Yates-American Machine Co. 56

Young Radiator Company 62

The Engineer's Field Report

CASE HISTORY
LUBRICANT RPM Delo Oils
FIRM Progressive Transportation Co, Compton, California

RPM DELO holds piston wear to .001" after 201,253 miles of on-and-off highway hauling

LUBRICATED WITH RPM DELO Oil, these engine parts were pulled from a Cummins HR diesel after 201,253 miles. A portion of this mileage was put on during four months of rugged service spotting loads of heavy pipe in the Arizona desert. When the engine was taken down, after two years of this on- and off-highway hauling, Progressive Transportation Co. found RPM DELO Oil had kept lacquer, gum, sludge, and deposits from forming...rod bearing wear varied between .0005 and .001 inch and pistons showed maximum wear of only .001". No wear at all evident on main bearings. Progressive Transportation uses RPM DELO Oils in all its large fleet of tractors—some of which have traveled well over 200,000 miles without overhaul.

Why RPM DELO Oils prolong engine life

Special compounds stop corrosion

Anti-oxidant resists lacquer formation

Detergent keeps all parts clean

Metal-adhesion qualities keep oil on parts in running or idle engines—inhibitor resists foaming

LUBRICATING OILS RPM DELO

For More Information... about this or other petroleum products of any kind, or the name of your nearest distributor, write or call any of the companies below.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • **STANDARD OIL COMPANY OF TEXAS**, El Paso
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • **THE CALIFORNIA COMPANY**, Denver 1, Colorado

Quarter-scale model of experimental gas turbine being developed by Cooper-Bessemer and Pratt & Whitney Aircraft. Units should be available for use within 18 months.

How Cooper-Bessemer is teaming up with Pratt & Whitney Aircraft to develop JET TURBINE POWER for industry

The cutaway model shown is a revolutionary new concept in gas turbines. The generating unit is a new Pratt & Whitney Aircraft jet engine—a modification of the famous J-57 aircraft engine, designed for gas fuel. The companion power unit is a new Cooper-Bessemer power turbine. This combination, now in the advanced experimental stages, represents the hottest development in industrial power in 20 years. It will mean drastic economies in installations of engine-driven compressors, generators and other rotating machinery.

For example, in gas compressor stations, it is expected to reduce total station cost by 50%!

Plans call for this new gas turbine to be available for broad application within 18 months. In the meantime, watch for reports on further developments in this pioneering teamwork by Cooper-Bessemer and Pratt & Whitney Aircraft.

BRANCH OFFICES: Grove City • New York • Washington • Gloucester Pittsburgh • Chicago • Minneapolis • St. Louis • Kansas City • Tulsa New Orleans • Shreveport • Houston • Greggton • Dallas • Odessa • Pampa Casper • Seattle • San Francisco • Los Angeles

SUBSIDIARIES: Cooper-Bessemer of Canada, Ltd. . . . Edmonton • Calgary Toronto • Halifax

C-B Southern, Inc. . . . Houston

Cooper-Bessemer International Corporation . . . New York • Caracas • Mexico City

Cooper-Bessemer, S.A. . . . Chur, Switzerland • The Hague, Netherlands

Cooper Bessemer

GENERAL OFFICES: MOUNT VERNON, OHIO

ENGINES: GAS - DIESEL - GAS-DIESEL
COMPRESSORS: RECIPROCATING AND CENTRIFUGAL
ENGINE, TURBINE OR MOTOR DRIVEN